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FUTURES HORIZON TO SUSTAINABILITY CHALLENGES OF THE LAO PDR 2050

Adaptive Foresight Thinking and New Futures
Perspectives to Energy and Natural Resource
Planning in the Lao People's Democratic
Republic

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1. INTRODUCTION

This e-book is focused on energy and natural resource planning in Lao PDR. Our aim is to present some futures oriented analyses and discuss key planning challenges of Laos's energy economy and natural resource use. In this e-book we link these questions to the Adaptive Foresight methodology, we have used as general framework in interactive and participative projects in Lao PDR.

The study is organized in the following way. In Chapter 2 we present some background information and fact-finding observations of the key development trends in Lao PDR. In Chapter 3 we present some long-run scenario analyses of key development in Lao PDR. These scenario analyses are based on the International Futures (IFs) model. For vital planning purposes we present demographic scenarios, economic growth scenarios, urbanization scenarios and some energy scenarios. These scenarios are baseline scenarios, thus the most expected scenarios in the long-run. Because these scenarios are long-run scenarios, they are robust figures about futures developments in Lao PDR.

In Chapter 5 we present some backcasting visions and policy targets of the Lao PDR. Naturally, these normative futures oriented goals are linked to 5-year planning and other official key visions of the Laotian economy and society. In Chapter 6 we summarize key learnings and findings of the Adaptive Foresight Process the FREPLA 2020 research team observed in regional workshops in Lao PDR.

In Chapter 7 we are analysing some key characters of the portfolio of the government of the Lao PDR. This analysis gives many important background factors on the table when Laos's energy and natural resource strategy is analysed and understood better.

In Chapter 8 we analyse key adaptive mechanisms and challenges of resource governance and management in Lao PDR. In Chapter 9, we discuss shortly available green growth and green economy opportunities in Lao PDR. Key summary findings are presented in Chapter 10.



2. BACKGROUND OF KEY DEVELOPMENT TRENDS IN THE LAO PDR

As widely known, the Lao People's Democratic Republic, is a least developed land-locked country in Southeast Asia. Lao PDR is not doomed to be poor country, because it has tremendous potential for hydropower projects because of its access to the tributaries of the Mekong River, generous rainfall, hilly terrain and a low population density that limits the need for human settlements along rivers. Lao PDR shares a border with developing countries such as Thailand, Cambodia and Vietnam wanting to import electricity to meet their domestic demand. The challenge in Lao PDR has been rural electrification but still Laotian energy planners face some problems supplying energy utilities to a large proportion of their population. (Smith & Bush 2009). In Laos, the country's low population density and rugged terrain make it difficult and costly to connect everyone to a national electricity grid. To some extent, this situation can create social tensions: while there is plentiful electricity for export, providing domestic access is difficult. However, the Government of Laos has been very active in rural electrification in cooperation with the World Bank, and so called Laos Rural Electrification Phase 1 (Laos REP 1) has reached promising results, in aggregate electrified more than 600.000 households. Among the ASEAN countries, Lao REP 1 has seen as one of the rural electrification programmes. In 2009 rural electrification rate in Lao PDR was 63%, quadrupling from electrification rate of 16% in 1995. Today electrification rate is estimated to be over 70%. (Bambawale, D'Agostino & Sovacool 2011, 41). Energy expert Khamphone of the MEM (2014) estimates that electrification rate is already 87 % in Laos.

Positive trade growth and greater trade openness are the results of greater economic cooperation and unilateral policy reforms in the Lao PDR (Menon & Warr 2013, 5). According to the news from Vientiane Times (21 Oct 2013) the Ministry of Planning and Investment (MPI) reported that the energy sector received in 2012-2013 (in the first 11 months of last fiscal year, October 2012-August 2013) the largest amount of investment at over 12.2 trillion kip (US\$1,565 million), followed by the mining sector with over 8.57 trillion kip (US\$1,099 million) in 37 projects, while 858 billion kip (US\$110 million) was invested in hotels and restaurants. The largest amount of investment in energy is for construction of the Nam Ngiep 1 hydropower project in Borikhamxay province with more than 6.77 trillion kip (over US\$868 million) invested, the MPI report noted. In the fiscal year 2012-2013 investment came from 12 countries according to the MPI. China invested the largest amount with more than 10.42 trillion kip (US\$1,337 million), while Lao businesses invested more than 4.13 trillion kip (US\$530 million) and in third place was Thailand with companies sinking more than 3.24 trillion kip (US\$416 million) into projects in Laos.

In Fig. 2.1 we have figures out both goods and service export trends in the Lao PDR. Exports have been developing in a favourable way in Laos, especially the volume of goods exports has increased in a considerable scale in 2005-2011.

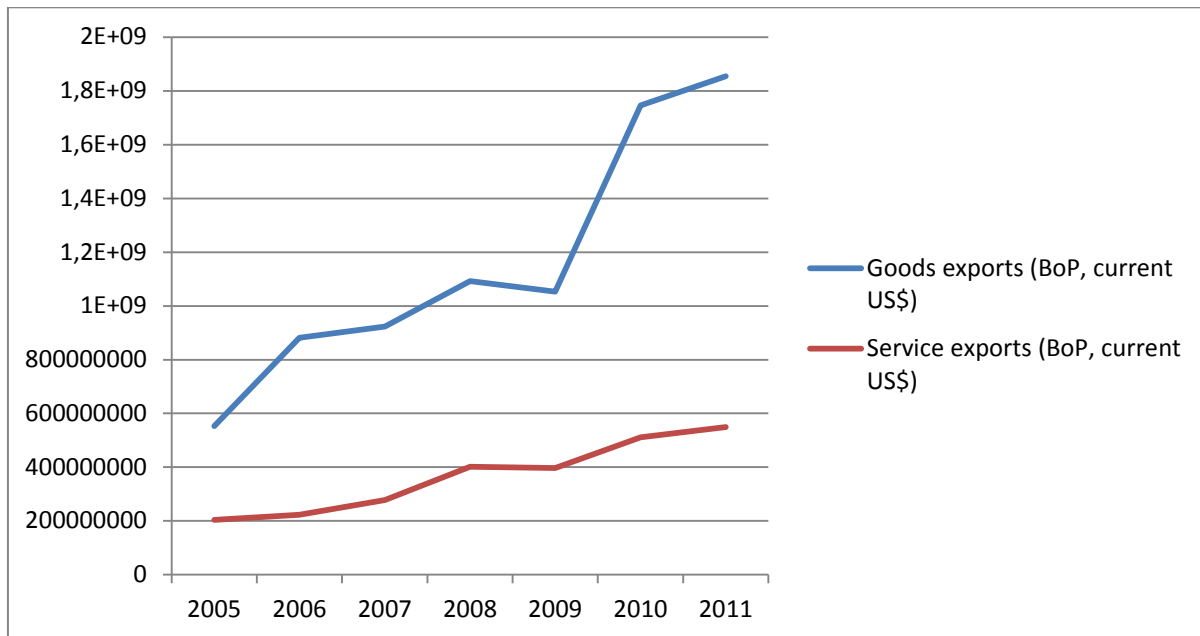


Figure 2.1. Exports of goods and services in Lao PDR (BoP, current US dollars), years 2005-2011 (World Bank 2013), figures are evaluated in USD.

In Fig. 2.2 we have visualized a long-run development statistics of net official development assistance (ODA) received in the Lao PDR. Official development assistance (ODA) is a term coined by the Development Assistance Committee (DAC) of the Organisation for Economic Co-operation and Development (OECD) to measure foreign aid. It is widely used as an indicator of international aid flow. It includes also some loans. In the Lao PDR rate of ODA was decreasing in 1967-1983, but increasing in 1984-2011.

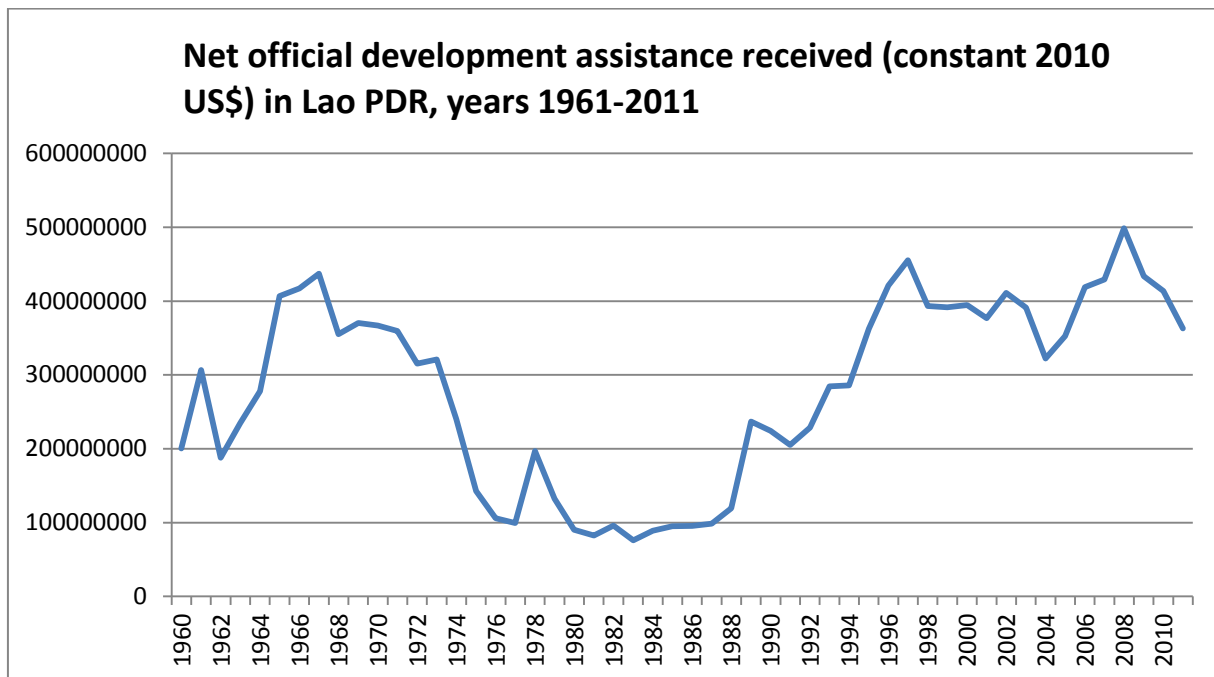


Figure 2.2. Net Official Development Assistance received (constant 2010 US\$) in Lao PDR, years 1961-2011 (World Bank 2013).

In Fig. 2.3 we have visualized a long-run statistics of net ODA per capita in Lao PDR. This figure shows an upward sloping trend development since 1984.

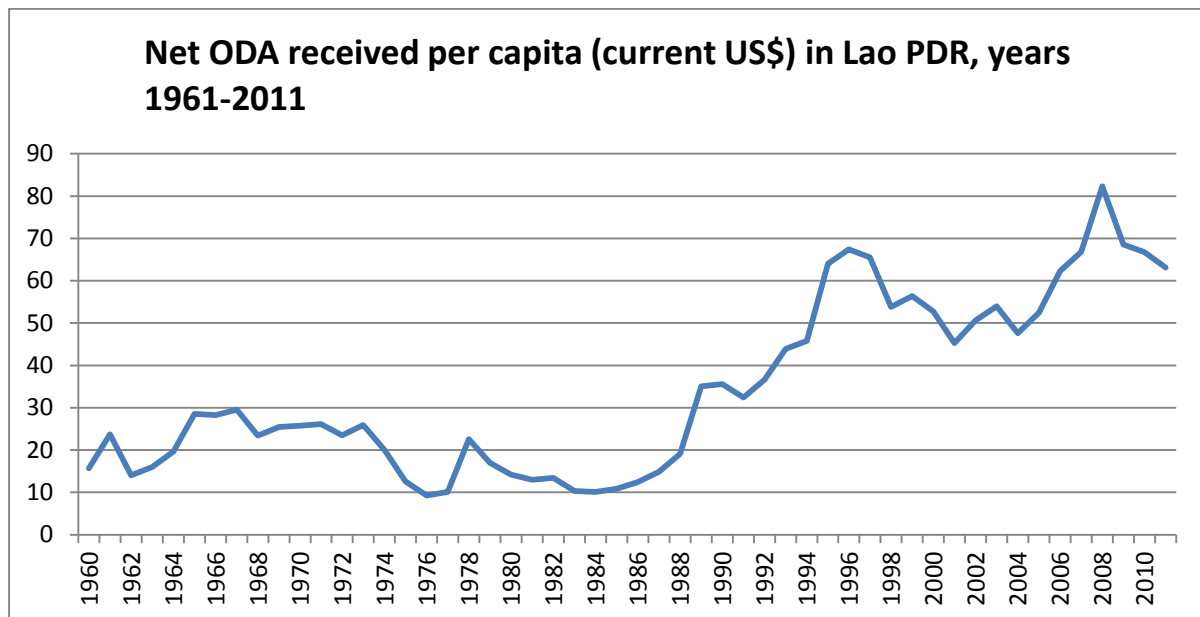


Figure 2.3. Net ODA received per capita (current US\$) in Lao PDR, years 1961-2011 (World Bank, 2013).

In Fig. 2.4 we have calculated net ODA assistance per capita (constant US\$) in Laos. We can observe a decreasing long-run trend of this key indicator in Lao PDR.

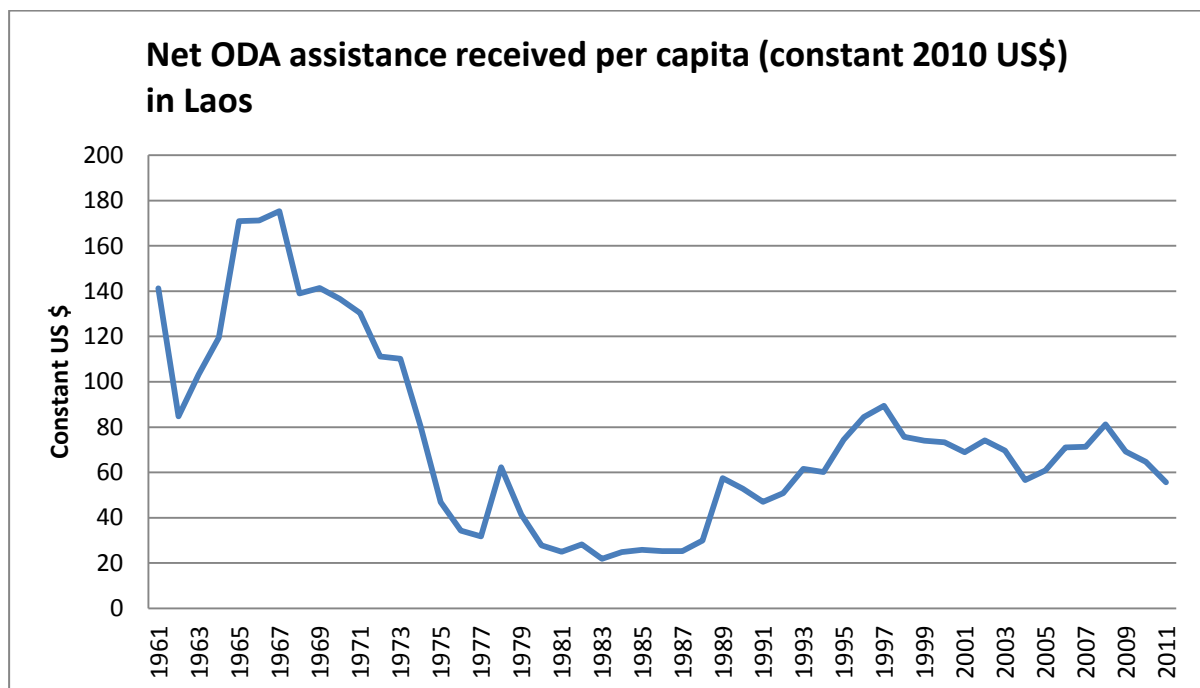


Figure 2.4. Net ODA Assistance received per capita (constant 2010US\$) in Laos (World Bank 2013).

In Fig. 2.5 we have figured out net ODA as % of imports of goods, services and primary income in 2006-2012. This statistical indicator informs us that in relation to imports of goods, services and primary income, ODA flows have decreased in the Lao PDR since 2008.

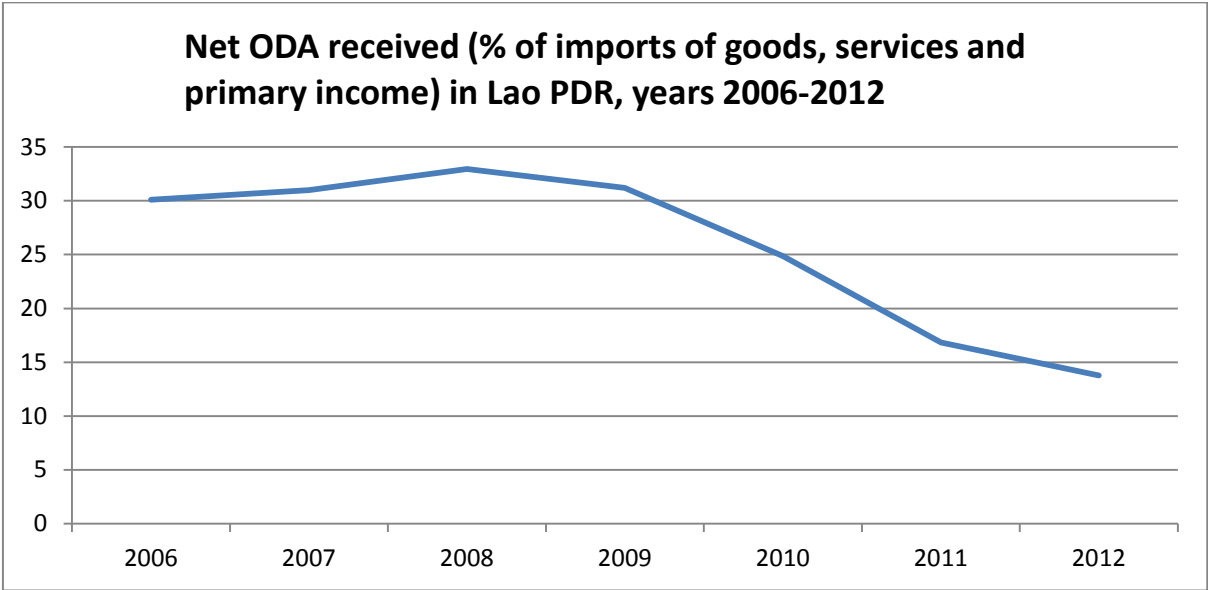


Figure 2.5. Net ODA received (% of imports of goods, services and primary income) in Lao PDR, years 2006-2012 (World Bank 2013).

Another indicator, net ODA received, % of central government expense in the Lao PDR, has decreased in 2006-2012. In 2006, it was over 100%, but in 2012 it was already below 20%. In relation to government expenses, net ODA received has decreased dramatically in Laos showing considerably low dependence today on official development aid.

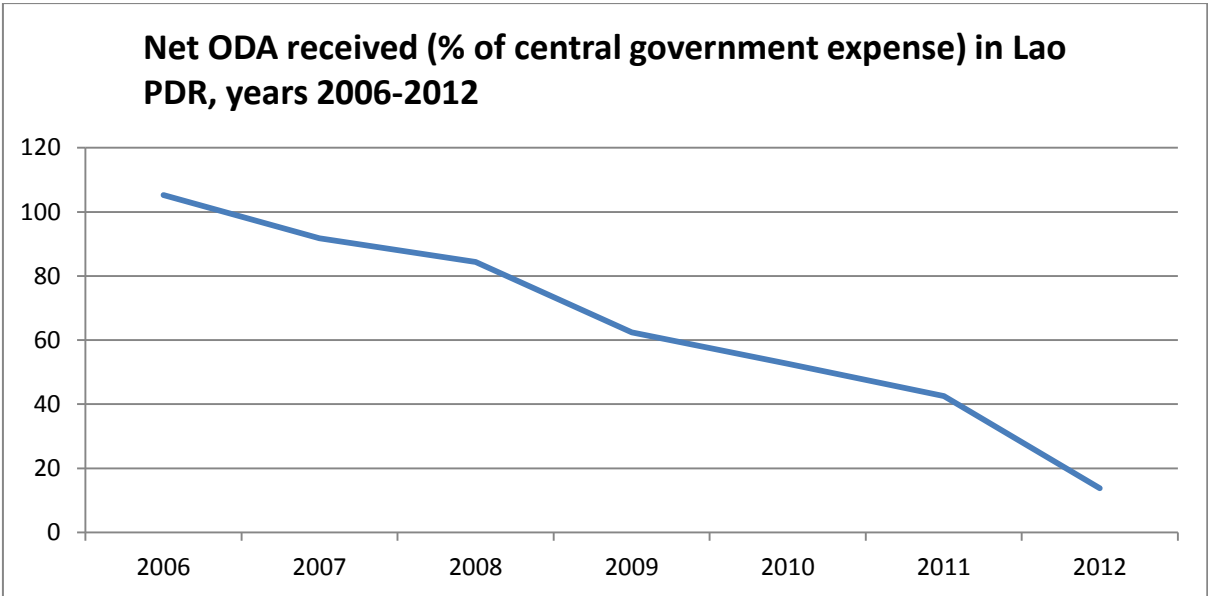


Figure 2.6. Net ODA received (% of central government expense) in Lao PDR, years 2006-2012 (World Bank 2013).

We have reported country level ODA transfers in Fig. 2.7. Mostly trends of ODA transfers have been increasing. Among others, Australia and the European Union are key actors of ODA transfers.

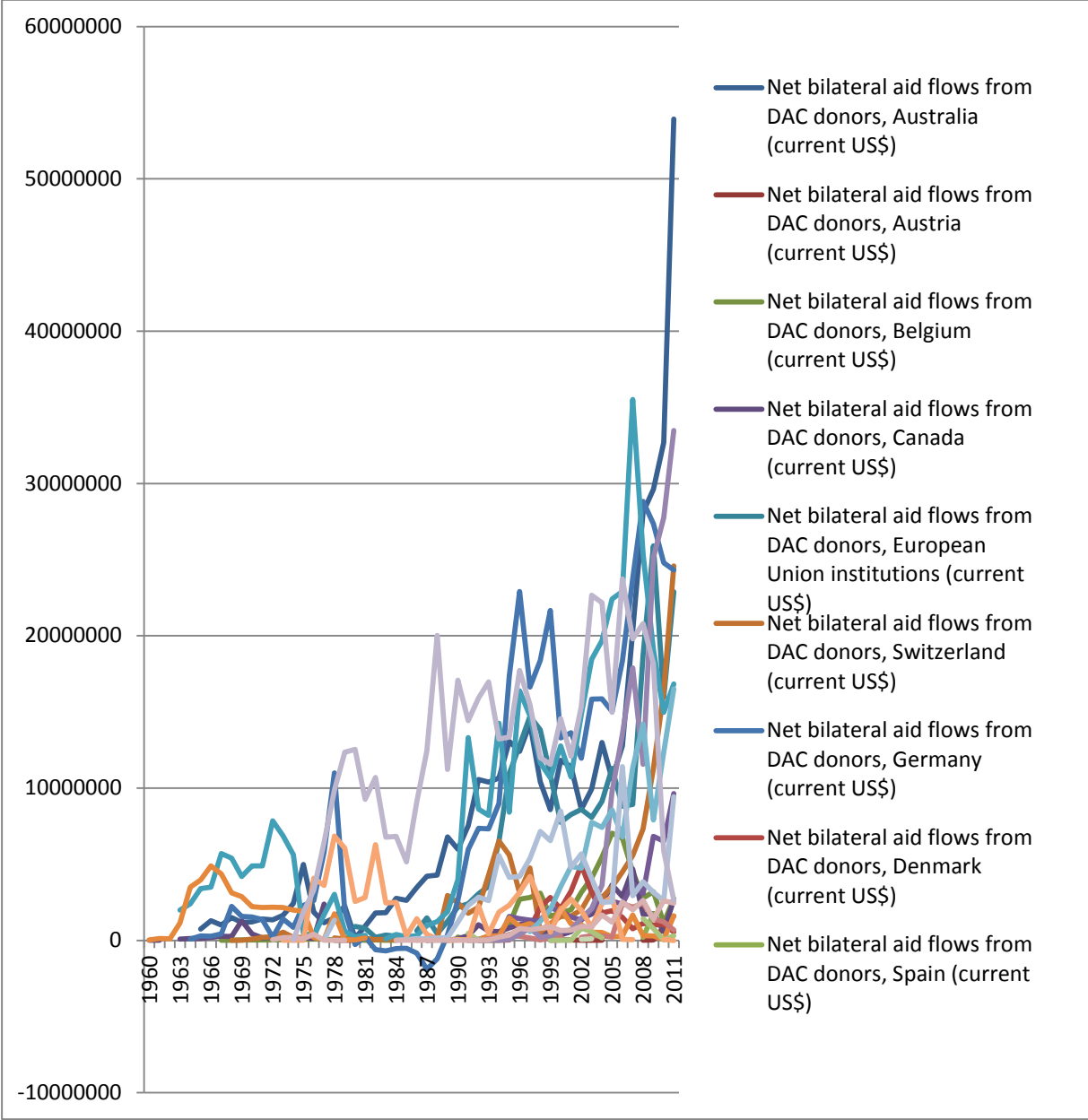


Figure 2.7. Net Bilateral Aid from various countries to Lao PDR, years 1960-2011 (World Bank 2013).

Figures 2.2.-2.7 inform us that Lao PDR is still quite dependent, but not very dependent on the ODA transfers. Remarkable transfers have been made from various countries. However, key statistical indicators of the ODA transfers are indicating that ODA dependency ratio has decreased since 2006.

In Fig. 2.8 we have analysed statistical information concerning net ODA received/GDP ratio in Laos. The results are reported in Fig. 2.8. This figure indicates that this critical ratio has decreased in recent years drastically. Policy turn happened already in 1998 and after this year ration has been decreasing. In 2002 it increased little but this small change did not changed downgoing trend.

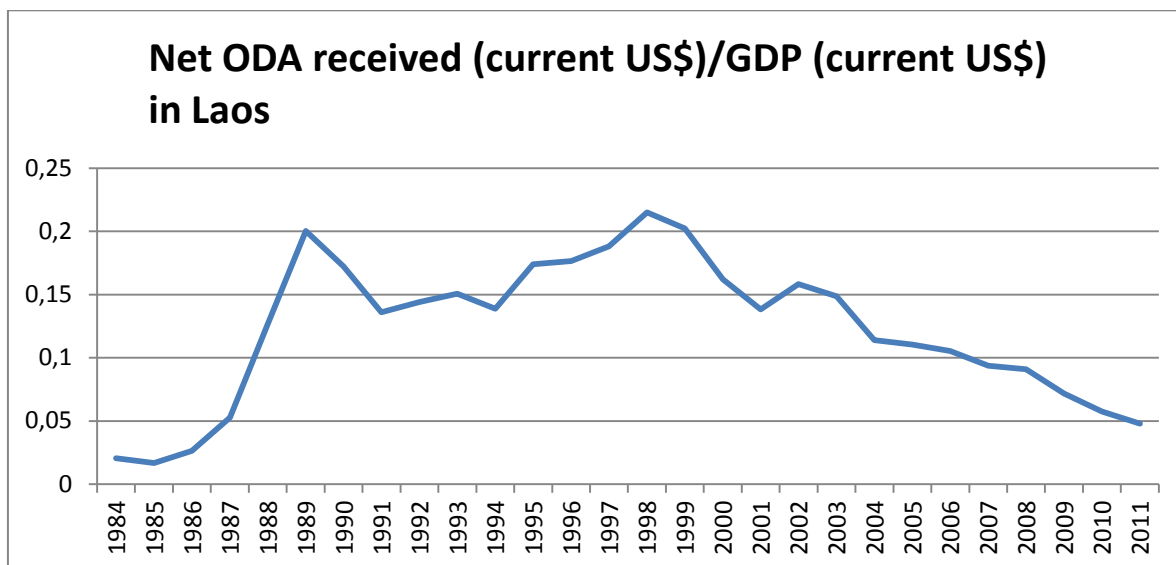


Figure 2.8. Net ODA received (current US\$)/GDP in Laos (World Bank 2013).

In Fig. 2.9 we have reported also two other ratios, net official development assistance received (current US\$)/FDI, net (BoP, current US\$) and Net official development assistance received (current US\$)/Portfolio investment (BoP, current US\$). First ratio is quite stable but the second seem to be quite unstable. However, we cannot make strong conclusions on the basis of these ratios. Stable development of the ratio, net official development assistance received (current US\$)/FDI, net (BoP, current US\$), is good issue for public sector planning in Laos.

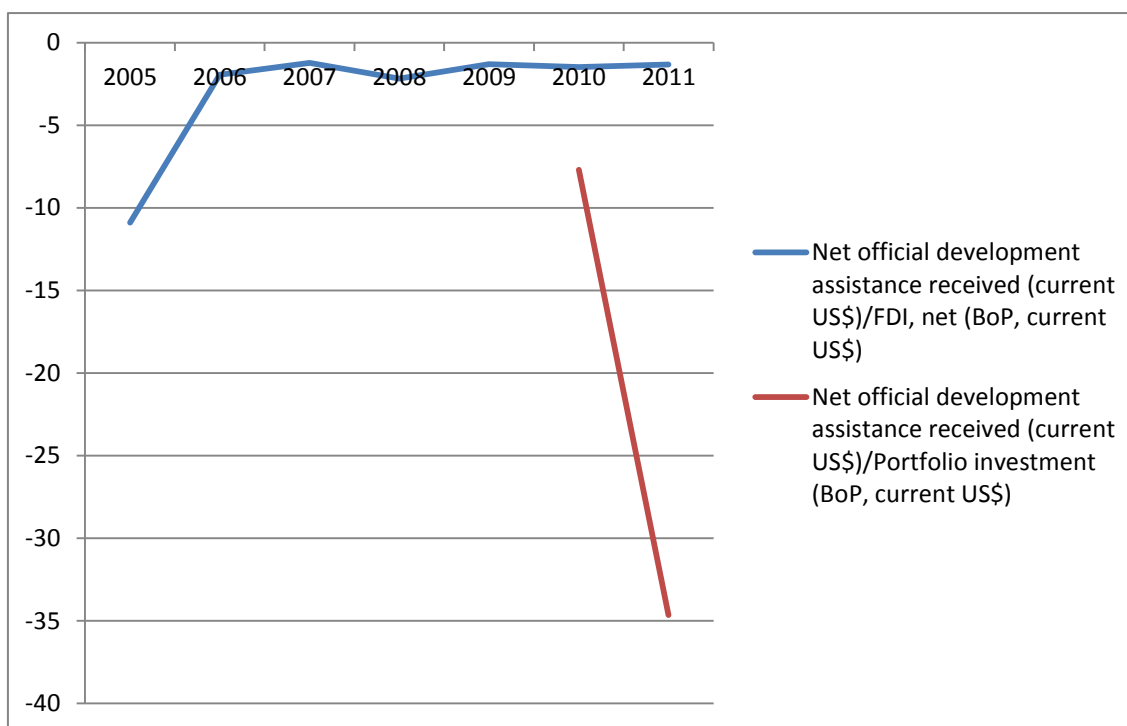


Figure 2.9. Two ratios, (1) net official development assistance received (current US\$)/FDI, net (BoP, current US\$) and (2) net official development assistance received (current US\$)/Portfolio investment (BoP, current US\$) (World Bank 2013).

The Aid Management Platform (AMP) was fully implemented in 2012 by the Government of the Lao PDR, in partnership with Development Gateway and the United Nations Development Programme (UNDP). At the close of the Fiscal Year in September 2012, the AMP in Laos accounted for 33 development partners, 454 projects and approximately total \$2.5 Billion dollars in financial commitments to the Lao PDR. The latest ODA evaluation results indicate that Japan, the Asian Development Bank, and Australia ranked as the top three providers of ODA by total disbursement over the last fiscal year. Infrastructure and education were the top two recipient sectors of ODA financial flows respectively, together comprising approximately 45% of total ODA in Laos. Eradicating extreme poverty and hunger (MDG Goal 1) and developing global partnerships for development (MDG Goal 8) received the largest portion of annual development finance. Notably, according to the FAIR, quite surprisingly 17% of ODA was not aligned with any development MDG's. This suggests that almost 20% of aid projects in the Lao PDR are not correlated with the Government's development strategies (The Ministry of Planning and Investment, 2013).

The political climate of the Lao PDR has been changing towards more liberal direction. For example, in 2009, despite the fact that the government is still officially communist, the Obama administration in the U.S. declared that Laos was no longer a Marxist-Leninist state and lifted bans on Laotian companies receiving financing from the U.S. (Fuller, 2009). However, some recent incidents¹ of the expelling of the country director for Helvetas Swiss Intercooperation, and the suspected abduction of a highly respected Lao Civil Society Organisation figure indicates the Party's tightening grip on civil society and media.

Another important step toward liberal economic policy happened in 2011, when the Lao Securities Exchange began trading. Third step was in 2012 that the government initiated the creation of the Laos Trade Portal, a website incorporating all information traders need to import and export goods into the Lao PDR. The operation of the Lao Securities Exchange (LSX) has started slowly, partly because of global financial crisis. The LSX was launched in January 2011 with help from both the SET and the Korea Exchange of South Korea (KRX). The KRX holds a 49 percent stake in the LSX operating company. The KRX holds as well as 4 percent of the CSX. Laos has set ambitious goals for its exchange in the face of setbacks. The LSX plans to have 10 listed companies by 2016, which means it needs to attract eight more companies. It also hopes to reach the break-even point within five years, by 2018 (Song, 2013).

We can see the results of policy in Fig. 2.10. All key volume indices have been increasing in import and export. In Laos export volume index and value index have increased more than import volume index and import value index.

¹ More information on recent developments available e.g: Creak, S. & Barney, K. (2012). Distressing developments in Laos. <http://asiapacific.anu.edu.au/newmandala/2012/12/23/distressing-developmentsin-laos/>

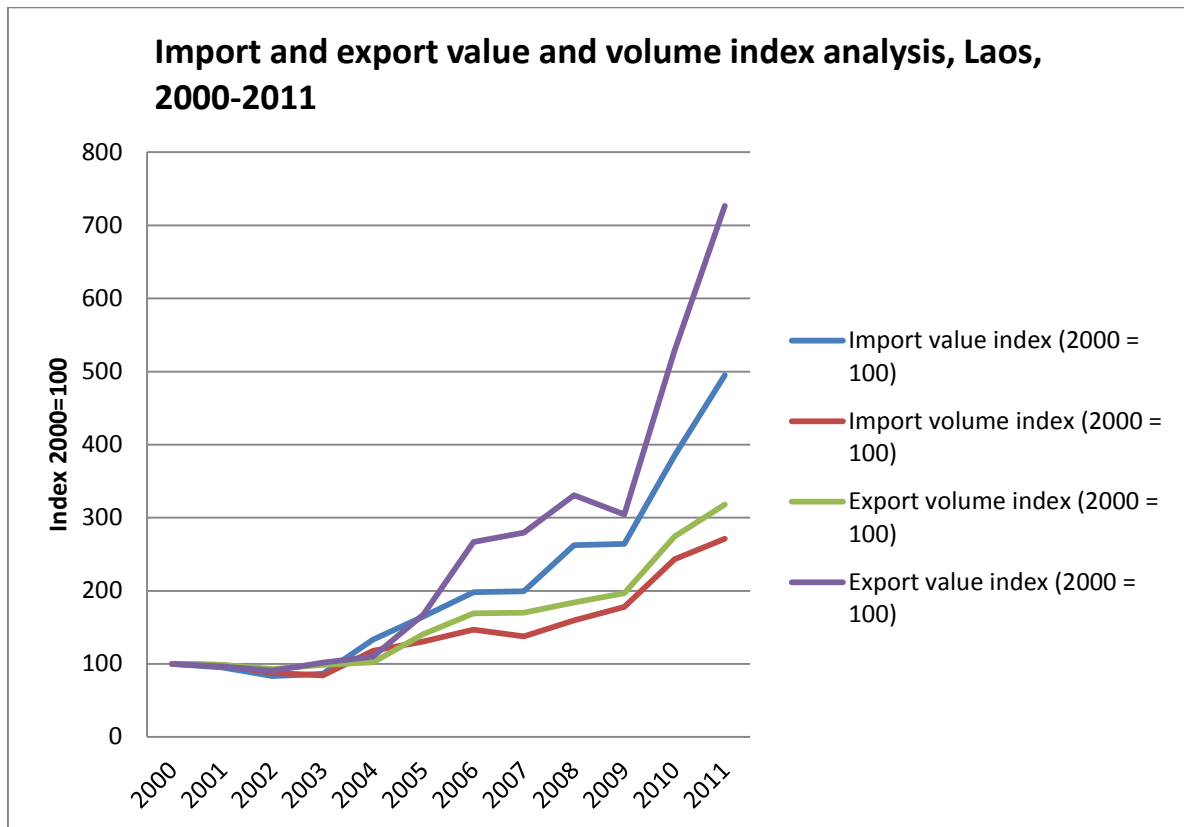


Figure 2.10. Export value index and import value index, export value index and export volume index in Laos, years 2000-2011 (World Bank 2013).

We can report also some analyses of recent policy changes. In Figures 2.11, 2.12, 2.13 we present a comprehensive policy analysis focused on relevant policy fields in Laos. These analyses are based on World Bank Country Database of Laos (World Bank 2013).

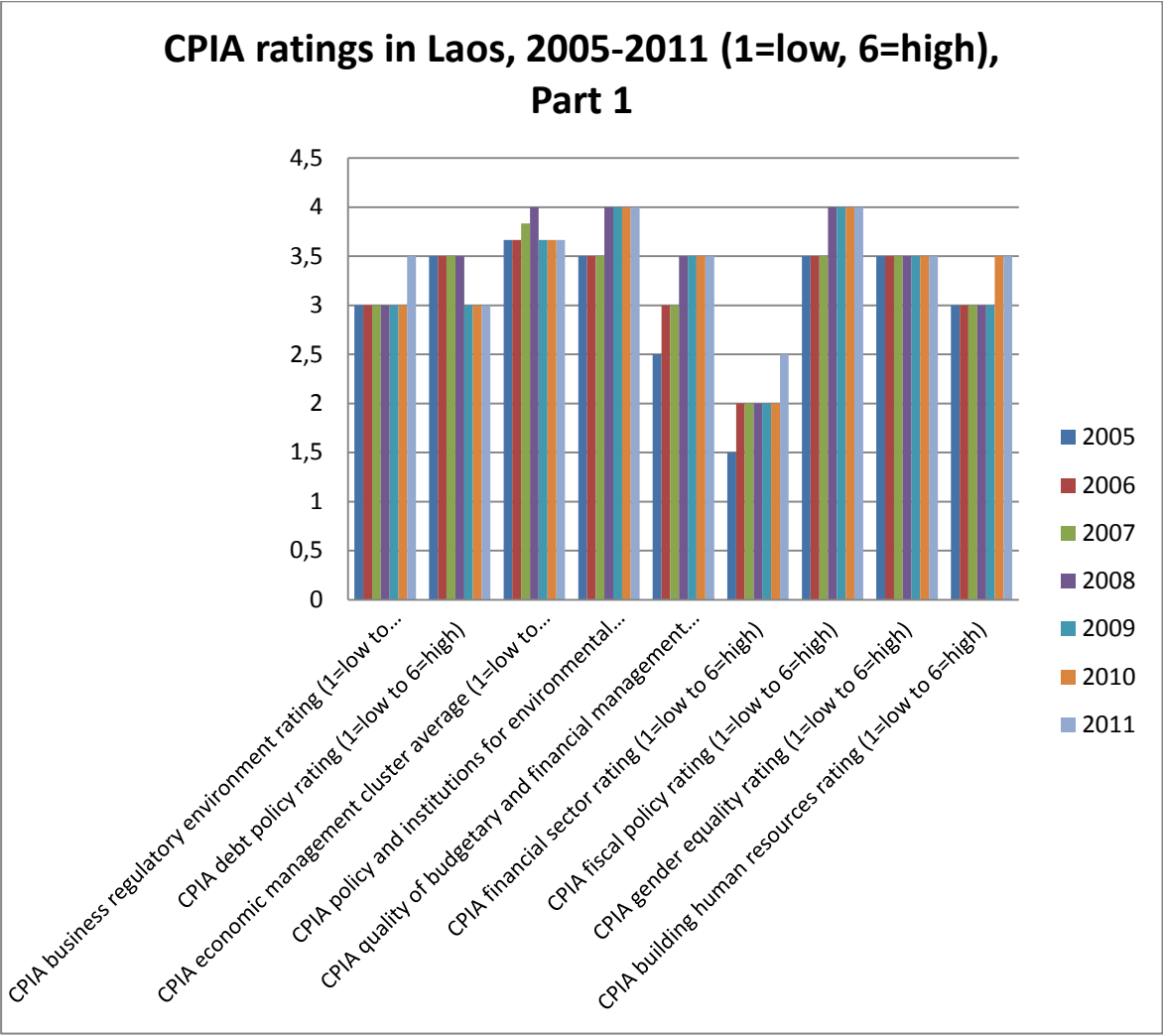


Figure 2.11. CPIA ratings in Laos, years 2005-2011 (1=low, 6=high), Analysis, Part 1.

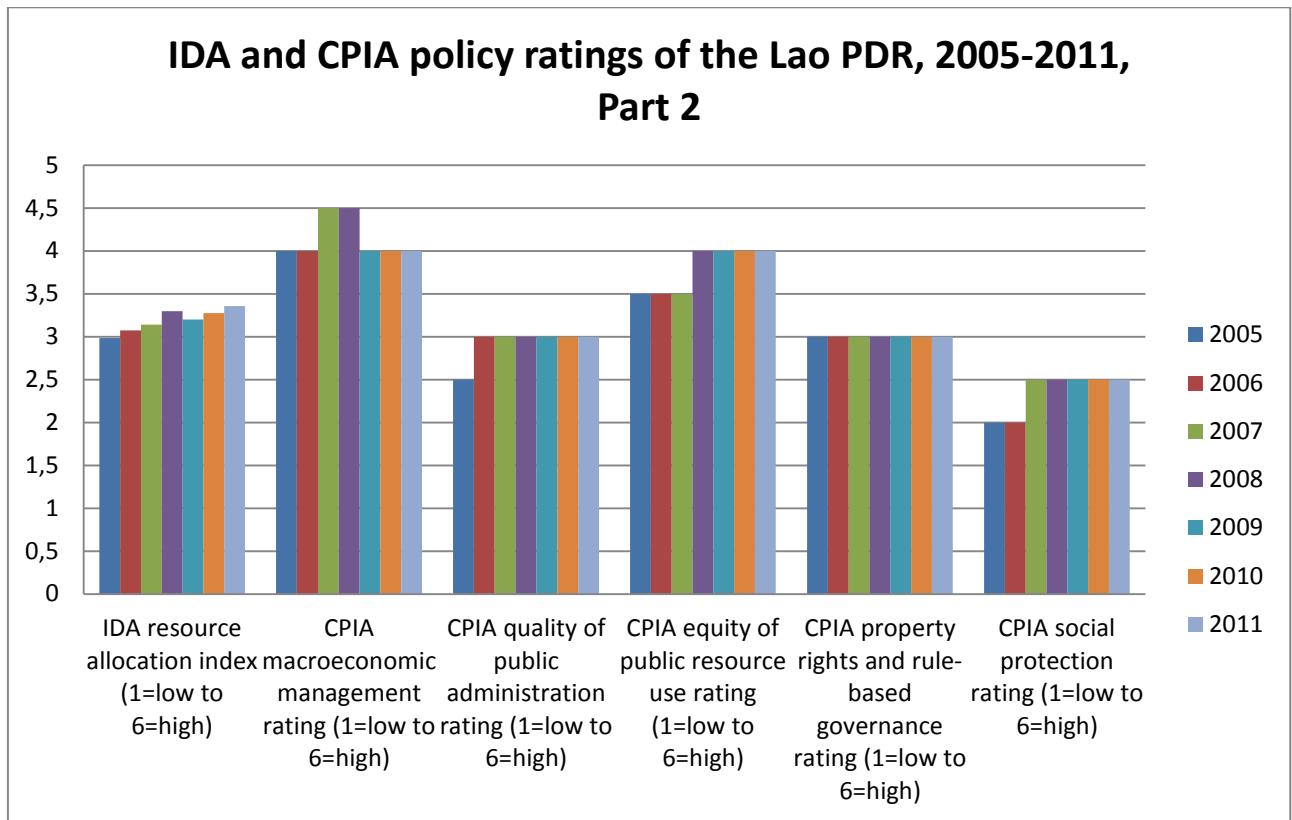


Figure 2.12. CPIA ratings in Laos, years 2005-2011 (1=low, 6=high), Analysis, Part 2.

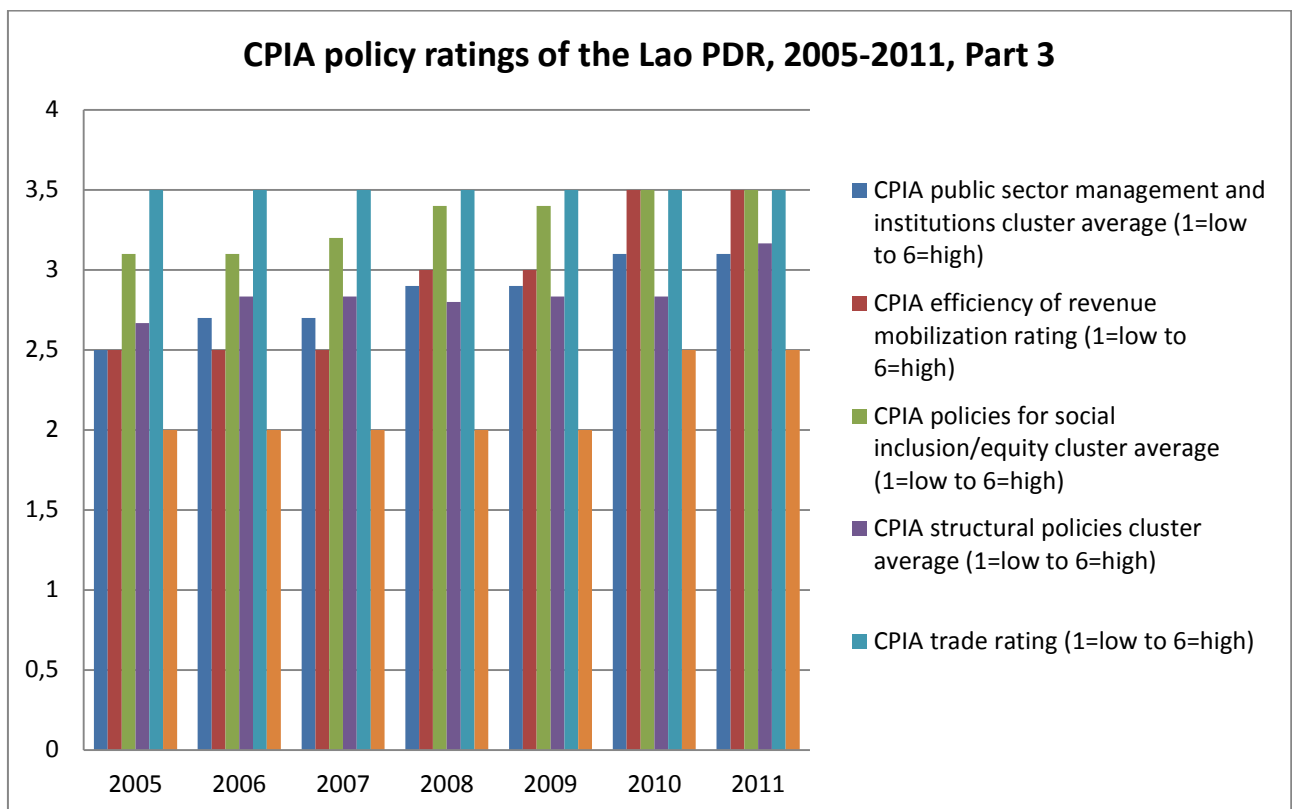


Figure 2.13. CPIA ratings in Laos, years 2005-2011 (1=low, 6=high), Analysis, Part 3.

All these CPIA analyses show that Laos policy and administration structures have been improved or stayed stable. Recent years have been progressive in different fields of policy making.

Recent years have been full of changes in economic policies towards liberal direction. Among reforms are Special Economic Zones, which help the Lao PDR to attract foreign direct investments and develop business friendly environment to build up local industries which was emphatically emphasized by the Deputy Permanent Secretary of Ministry of Industry and Commerce, Mr. Sirisamphanh Vorachit (personal communication, August 26, 2010). Special and Specific Economic Zone Developments are forms of economic opportunity which identify locations that will attract both domestic and foreign investors by offering tax and duty incentives in order to promote infrastructure development, services, production, skills development and the transfer of modern technology.

At present there are ten economic zones in Laos, two special and eight specific since the first one was established 10 years ago in 2003. In 2013 the National Committee for Special Economic Zones (NCSEZ) and the Ministry of Finance are making together a draft agreement on management policy and how to collect income from the Special and Specific Economic Zones in Laos.

The National Committee for Special Economic Zones (NCSEZ) is a specialised agency of the government with a mandate to assist it in leading and managing the SEZs throughout the Lao PDR, and is the focal point of coordination with all local and foreign parties concerned in order to ensure the implementation of state policy relating to SEZ activities. The NCSEZ needs to check all the Special and Specific Economic Zones in Laos in order to guarantee transparency, especially for the approval of investments, collecting tax and other related aspects of the system.

The main functions of the NCSEZ are to (1) lead and manage the SEZs nationwide, (2) to consider and (3) to approve the policies and legal acts pertaining to the development and management of SEZ activities in Laos and to research and look for funding sources and ensure the management of funds from both local and foreign investors for the purpose of developing the SEZ. (Vientiane Times 5.11.2013)

Especially free trade area of ASEAN will include many important political and economic changes in the Lao PDR. In joining the Association of Southeast Asian Nations (ASEAN) and ASEAN Free Trade Area (AFTA), the governments of Lao PDR among other Mekong Region countries have agreed to comply with the Common Effective Preferential Tariff (CEPT) Scheme, which reduces intra-ASEAN tariff rates on certain imports and may likely reduce Government revenue (Lao-Araya, 2002).

Related to this, a big question for Lao PDR and other Mekong countries is to introduce and implement tax structure and tax administration reforms and other complementary policies to safeguard and enhance revenue collection. Lao-Araya (2002) has proposed four different policies: First, they can strategically allocate goods among the four CEPT scheme lists. Second, the new member countries can improve their tax systems by replacing traditional general sales taxes with Value Added Tax and generally simplifying their tax structures. Third, they can reduce inefficiencies that impede tax collection by improving tax administration institutions and tools. Finally, they can improve their overall legal systems so as to discourage tax avoidance and evasion and reduce corruption among tax officials.

2.1. The Greater Mekong Sub-region and Laos

The Greater Mekong Sub-region (GMS) comprises of six countries, China, Myanmar, Laos, Cambodia, Thailand and Vietnam. These countries are located along the longest river in Southeast Asia called “Mekong River”. The Mekong River is the longest river in Southeast Asia and 10th, longest river in the world. It flows for 4880km through Yunnan, Myanmar, Laos, Thailand, Cambodia and Vietnam entering the South China Sea. In terms of discharges, the Mekong River is 6th largest. The Mekong River has made resources available for agriculture, hydropower and transport (Yu, 2003, 1221).

Economic and demographic structures of these countries are changing rapidly due to modernization and industrialization. Pre-modern societies are changing to modern societies. Regional cooperation has the potential to accelerate energy development in the GMS, but there is need to balance national interests and potential conflicts. Also international politics is related to GMS management. China’s first priority is to have hydroelectricity for industry. Laos wants to develop hydroelectricity to finance economic development. Thailand’s policy is divided between agriculture and hydroelectricity for industry. Cambodia’s policy is divided between agriculture and hydroelectric to finance economic development. Vietnam promotes strongly agriculture. (Chang, 2013, 289). These Mekong countries have been transforming from “front line” into a “corridor of commerce” (Bakker, 1999).

In 1999, the World Bank (1999) made electricity demand forecast of the GMS for 2020, which showed Low Scenario with 415 242 GWh, Base Case Scenario with 497 298 GWh and High Scenario with demand 830 799 GWh. Thus, there is considerable electricity demand of the GMS (Yu, 2003, 1222). Laos is having highest hydro power potential with Yunnan region. That is why, in some vision, Laos is seen to be “the Switzerland of ASEAN” – crossed by roads and railways, a country of services and hydropower”. In Thailand, Cambodia and Vietnam the potential is smaller (Bakker, 1999, 209, 214, 219). Energy security and climate-friendly development are key challenges in these countries. Especially, negative externalities of dams like fish losses and negative implications for land and water resources should be managed professionally with integrated management tools (Orr et al., 2012).

According to GMS strategies and scenario analyses, Laos has the following base case scenario:

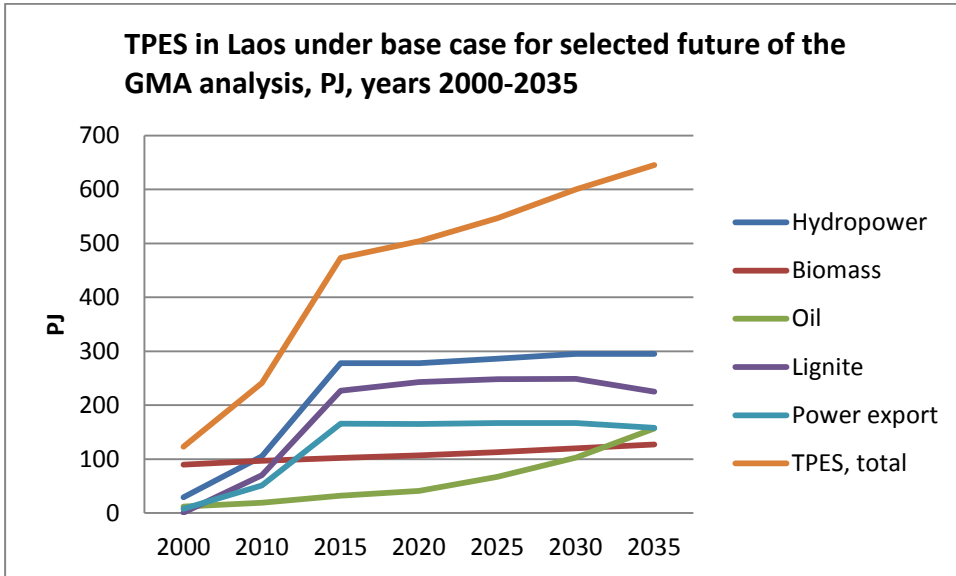


Figure 2.14. TPES in Laos under base case for selected future of GMA analysis (Watcharerejyothin & Shrestha, 2009b, 4432)

Power generation capacity in Laos under GMS scenario base case will be following according to GMA scenario analysis:

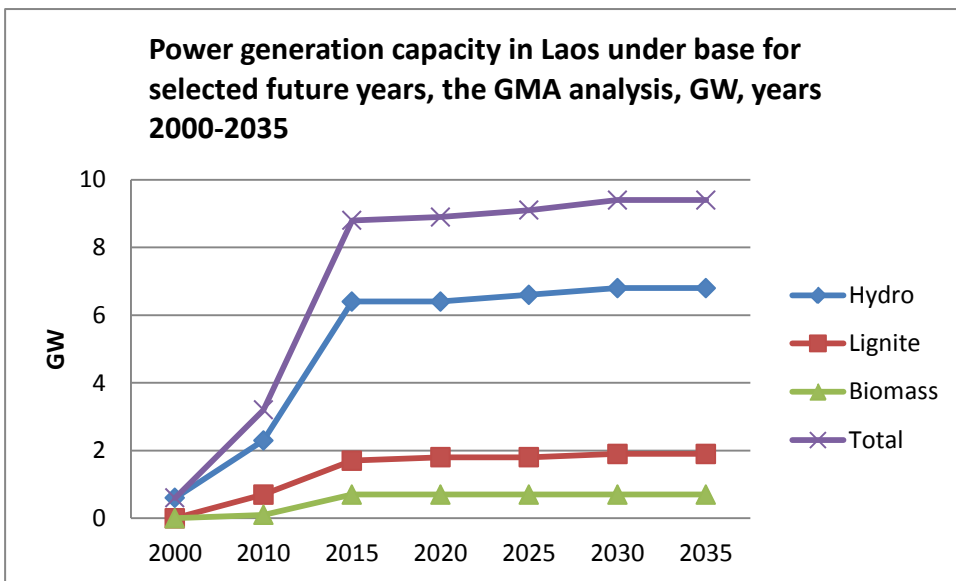


Figure 2.15. Power generation capacity in Laos under base case for selected years (Watcharerejyothin & Shrestha, 2009b, 4432).

According to GMS strategies and scenario analyses, TFC (PJ) in Laos under base case for selected future years is the following:

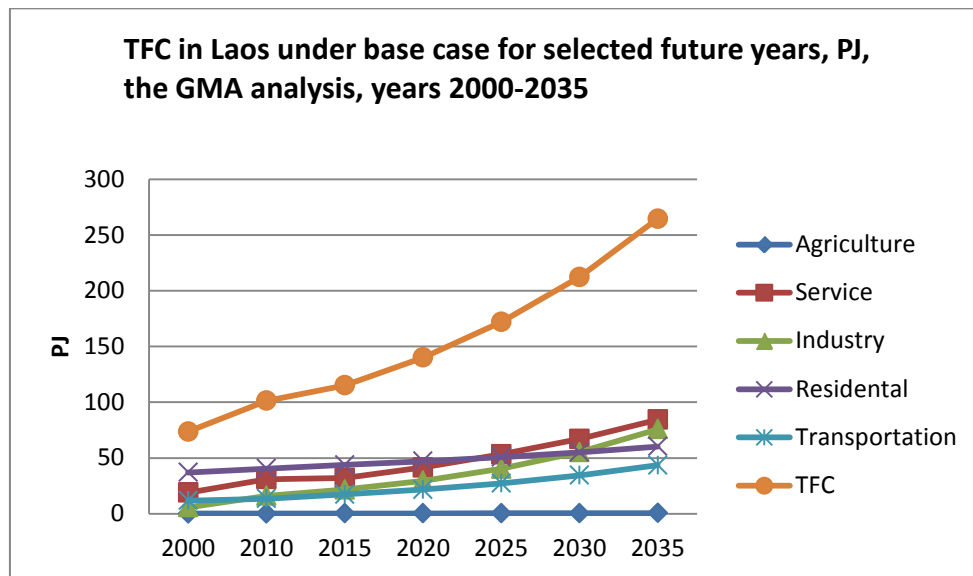


Figure 2.16. TFC in Laos under base case for selected future years, PJ, the GMA analysis, years 2000-2035 (Watcharerejyothin & Shrestha, 2009b, 4432).

Total greenhouse emissions in Laos, base case scenarios for selected future years, (10^3 tons) are visualized in Fig. 2.17.

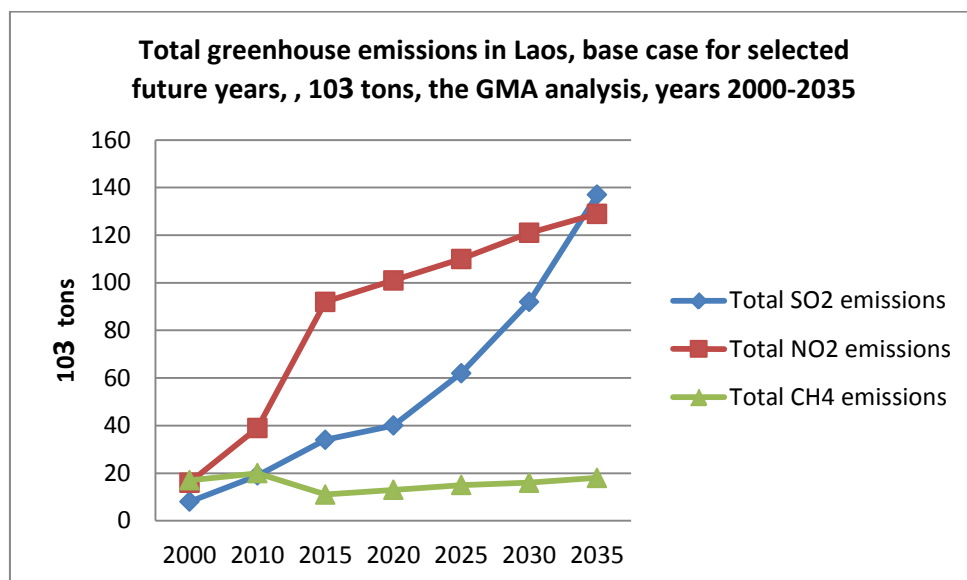


Figure 2.17. Total greenhouse emissions in Laos, base case for selected future years, 10^3 tons, the GMA analysis, years 2000-2035 (Watcharerejyothin & Shrestha, 2009b, 4432).

Total CO₂ emissions and CO₂ emissions in different economic sectors in Laos, base case scenarios for selected future years, (10^3 tons) are illustrated in Fig. 2.18.

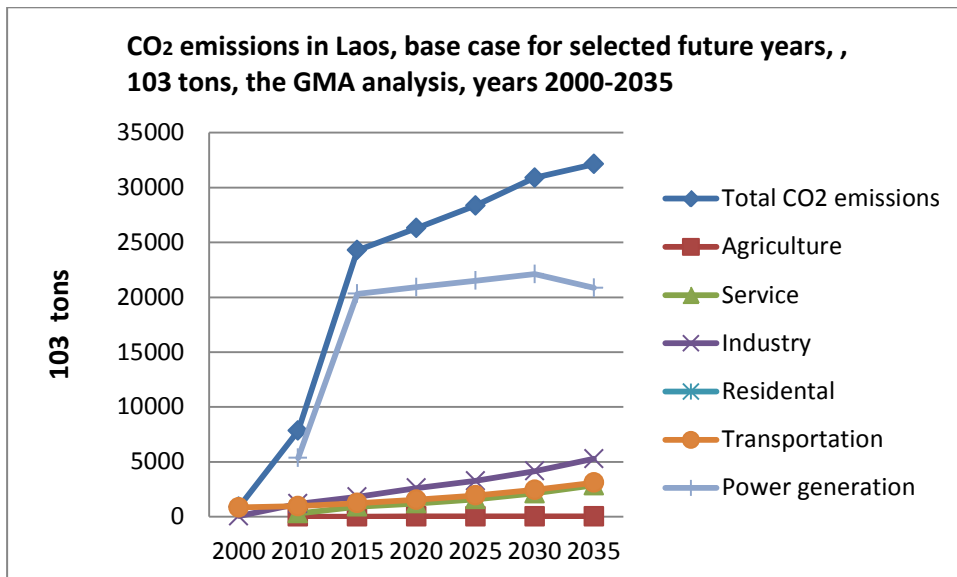


Figure 2.18. CO₂ emissions in Laos, base case for selected future years, 10³ tons, the GMA analysis, years 2000-2035 (Watcharerejyothin & Shrestha, 2009b, 4432).

Among ASEAN countries key sustainability strategies are: (1) increasing energy efficiency (both supply and demand side), (2) exploitation of renewable resources (mostly hydro) and (3) integrated approach on energy (and other natural resource) resource management (Karki, et al., 2005).

2.2. Electricity Export

Recent studies have showed that energy export to Thailand would make Laos to become net energy exporter, earn significant export revenue, and improve the increase in revenue of energy export per increase in total energy system cost from the maximum exploitation by hydropower resource. Also CO₂ emissions could be reduced in Thailand with electricity export (Watcharerejyothin & Shrestha, 2009a). Laos has memorandums of understanding and contract to supply 7000 MW of power to Thailand, in addition to 5000 MW power to Vietnam and 1500 MW to Cambodia by 2020 (Smits, 2011). In 2011 Laos had staggering 2520 MW of hydroelectric dams under construction compared to the 662 MW in current operation. This operation will quadruple the size of Laos’s electricity sector (Cruz-del Rosario & Souksavath, 2011).

In the case of large scale renewable energy export so called “resource curse” problem may arise. It is not only possible in the cases of oil and gas export. Resource abundance can hamper economic growth. Many studies show that countries with a high ration of natural resource exports have on average lower economic growth rates. Some studies and authors refute the resource curse hypothesis (Brunnschweiler & Bulte, 2008). Eisgruber has identified this kind of “resource curse” problem in Laos, Mongolia and in the Middle East and North Africa (MENA) region. Such phenomena like (1) exchange rate appreciation, (2) sectoral shifts of resources, (3) unpredictable fluctuations, (4) corrupt redistribution of rents, (5) reduced government accountability and (6) competition for “fixed pie” instead of value adding activities are creating “resource curse”. He has also mentioned that resource blessing is possible via revenues through resource exports (Eisgruber, 2013).

Electricity export means deepening electricity market integration. In recent study of Wu (2013), three recommendations were given concerning global trends and electricity market integration: (1) countries should strengthen their national electricity markets and promote internal market integration, (2) countries should explore the possibility of sub-regional interconnectivity and cross-border electricity trade and (3) regulatory standards and rules should be harmonized over time.

Of course, Laos's electricity export strategy is closely linked to trade policy choices. Especially the question of effective rates of protection is a key policy question in Laos. Joining the World Trade Organization (WTO) requires a detailed assessment of national trade policies and institutions. Probably trade and tax policies will change in Laos in the future because of politically preferred WTO membership. One key question in this context is pricing policy of electricity utilities. Import duties, excise taxes, and export taxes need more political and planning attention. More research is needed in this strategic field. Also benchmarking analyses with other ASEAN countries (like Vietnam) will be useful (Humphrey, 1969; Kaivo-oja, 1989; Warr, 1992; Arhukorala, 2006; Marks, 2011).

2.3. Laos, Renewable Electricity Strategy and Climate Change

In the future many experts expect that Laos will invest in renewable energy resources. Actually Laos can rely almost fully on renewable energy resources. CO₂ emissions of the Lao PDR are very minimal compared to other ASEAN countries. Naturally, hydroelectricity power in the Mekong Greater Sub-Region is key renewable resource. However, also in tributaries of the Mekong River provide opportunities for pico-hydropower systems for local communities. Especially pico-hydropower systems provide possibilities to reduce Lao rural energy deficiencies (Vicente & Bludszuweit, 2012). Other off-grid systems like mini-grids, solar stand-alone systems, biomass gasification, hydro, wind and wave energy systems provide many possibilities to promote rural electrification (see Javadi et al., 2013). However one of the most effective strategies is to expand renewable energy access with pro-poor public private partnerships. The provision of energy services through renewable energy is very capital intensive and that is why the role of private sector is essential, because in less-developed countries government investments and budgets are insufficient to expand access to electricity and modern energy systems (Sovacool, 2013b).

There is need to pay attention to renewable electricity support mechanisms, because in other case market failures are very possible. Such problems like lack of knowledge, information asymmetries, shortages of equipment, electricity restructuring, investment biases and predatory practices by incumbents can be problematic for renewable energy policy. There is a need to develop policy instruments like (1) renewable portfolio standards, (2) green power programs, (3) R&D expenditures, (4) systems benefits charges (SBC), (5) investment tax credits (ITC), (6) production tax credits (PTC), (7) tendering, and (8) feed-in tariffs (FIT). The most preferred policy mechanisms are FITs (61%), RPS (12%), PTC (10%), R&D (9%), GPP (3%), SBC (2%), ITC (1%) and Tendering (1%) (Sovacool, 2010, 1785-1791).

In Laos, one problem related to climate change is long-term soil carbon loss and accumulation in catchment areas following the conversion of forest to arable land. This problem is a vital question in

Northern areas of Laos. Deforestation and cropping started in Laos 1967 and since then these activities has caused accumulative consequences (see Huon et al., 2013).

In Laos the energy demand patterns are typical for less-developed country. Prior to electrification fire-wood accounts 99% of primary energy demand. Commercial lighting is often used and only few have commercial electricity services. Without energy supply, productive time for livelihoods and education remains limited, which does not help to solve poverty problems (see Mustonen 2010, 1047).

2.4. Energy Security in Laos

Energy security has been in recent years a salient policy and political issue. In Laos energy security is a vital issue, especially in poor rural areas. Energy security is also important pre-condition for small and medium enterprises. Losses of productivity depend on the level of energy security. Recent studies of energy security tell that in Laos energy security is not best possible. In Laos average energy security performance among 18 countries was 11th, but better than in China and India. The best countries were Japan, Brunei and USA in this comparison. Savacool notes that for Laos energy security is very important strategic issue because of hydropower potential of 13 000 megawatts (MW). There are needs to build up power plants, transmission towers, roads, and better industrial and other infrastructures. Especially Laos should develop national railways. Now Laos is building dams, from 14 to 55, making Laos the “battery of Southeast Asia” (Savacool 2011, 5850; 2013, 152-153; Case, 2011). In the past 30 years approximately 15% the country’ hydropower potential has been developed (EPD webpage²).

² Department of Energy Promotion and Development (EPD), <http://www.poweringprogress.org/>.

3. ADAPTIVE FORESIGHT METHODOLOGY AND ADAPTIVE FORESIGHT PROCESS AND LONG-RUN PLANNING CHALLENGES OF THE ECONOMY IN THE LAO PDR

There is today a lot of literature on project and portfolio management (PPM). As Michal Porter has said: “the essence of strategy is choosing what not to do” (Porter, 2008). PPM helps stakeholders to manage this issue, but also focus on “what to do”. There is always the risk of informal process, where the pattern of project portfolio is not discussed too much. The project portfolio can become biased and lose its functions, if stakeholders do not see “the big picture” of portfolio pattern. Good project and investment portfolio management is a key issue for competitive intelligence and business analysis. There is need to have many project ideas for the selection of project portfolio. If there are not too many project ideas, the return of investment will be lower than in the case of very many project proposals. Governments who want to maximise return of investments and strategic value of their project portfolios create positive and innovative atmosphere for very many project proposals. Generating excitement, anchoring project selection process to strategic value added and making processes simple and transparent are important issues for successful project portfolio management. (Moore, 2010, 4-15).

It is important that project portfolio is linked to strategic goals and to long-range visions. It is also good to think whether to have one portfolio or many portfolios linked to various strategic goals. Strategic alignment can be very beneficial for achieving goals. Achieving strategic success depends on the quality of portfolio planning. Problems of project portfolio planning can: slow decision making, setting wrong goals, cognitive dissonance among stakeholders, various types of decision making biases and risks of commitment escalation. (Moore, 2010, 21-36).

Because of possible problems, it is important to pay attention to planning. Insufficient planning is a key reason for planning failures. Investing in education and training of planning staff is needed. Methods like collaborative scheduling, time management (avoiding project delays), scoping of projects and cost and budget planning, are needed in professional PPM. Integration of project implementation is not happening by ad hoc type activities. Also follow-up mechanisms require attention in PPM (Moore 2010, 39-52).

One way to plan strategic planning process is so called a Ten-Step Strategic Process (TSSP). The ten steps are as follows (Bryson 1995, 23-43).

1. Initiate and agree upon a strategic planning process.
2. Identify organizational mandates.
3. Clarify organizational mission and values.
4. Assess the organization’s external and internal environments to identify strengths, weaknesses, opportunities and threats (SWOT).
5. Identify strategic issues facing the organization.
6. Formulate strategies to manage these issues.

7. Review and adopt the strategic plan or plans.
8. Establish an effective organizational vision.
9. Develop an effective implementation process.
10. Reassess strategies and the strategic planning process.

In the case of Lao PDR these ten steps are included to the planning of five year plans. Adaptive Foresight Approach with portfolio planning exercises is a complementary planning approach in relation to this planning process model. TSSP and PPM are good planning approaches, especially if SWOT methodology is linked to these planning models in various line ministries.

Lao PDR is rich in natural resources, which creates both opportunities and risks. “Over the 80 years preceding 2011, total government revenue increased from 11 % to over 19 % of gross domestic product (GDP), due almost entirely to revenues derived from mining and hydropower” (Menon & Warr, 2013). The key challenge lies on the way the Government of Lao PDR uses these revenues effectively and sustainably by benefitting the Lao people.

Part of natural resources capital may be transformed into produced capital (GDP). This should be done efficiently (productive investments) and so that adjusted net savings rate (savings-depletion) remains positive. ‘Dutch disease’ phenomenon is an empirical reality for the Lao PDR and not just an abstract theoretical possibility (Menon & Warr, 2013). Non-resource growth is important, because it creates jobs, reduces poverty, and is usually more stable than hydro and mineral sector, which is prone to uncertainty and volatility.

Slowing the rate of absorption would reduce adjustment problems associated with the Dutch disease and would give the Lao public service more time to plan how to spend the revenues wisely. Rapid absorption of resource-based revenues is dangerous in a polity characterized by lack of coordination and accountability. To the extent that natural resource revenues are absorbed domestically in the form of increased public spending, the international evidence strongly suggests that expanded spending should be focused on rural spending, and on social services such as education and health. (Menon & Warr, 2013).

During the implementation of the FREPLA2020 project some key **challenges**³ were found and identified. Such challenges were:

1. Development of planning new planning systems and models;
2. Risk analysis and systemic management of national and foreign direct investments (local and foreign investments);
3. Sectoral co-operation and the development of integrated knowledge management systems (data banks, accounting systems and planning models);
4. Management of coming urbanization process (e.g. Sustainable or Eco-Cities Master Plans in the Lao PDR); and

³ Long-run social and macroeconomic development scenarios of Laos, observed challenges and needed development policy portfolios were presented at the High Level Seminar, 27.8.2010, Vientiane, Lao PDR.

5. Manufacturing and economic development strategy (more detailed than 5 year National Socio-economic Develop Plan with special development goal of national innovation policy).

3.1. Problems of the Planning and Management

In the workshops there were active discussions about these challenges and problems among the Lao officials from different Ministries. Key problems were:

1. How long it takes to meet the observed challenges? Time lags between action and results;
2. Internal stability challenge (budget balanced) and external challenge: Readiness to meet external shocks (like financial crisis);
3. Concrete action plans (not abstract ideas) are needed;
4. How ministries understand their missions and visions? A participative discussion framework needed for better ministerial co-operation;
5. Concrete discussions about futures alternatives; and
6. Material and immaterial resources for capacity building and development.

3.2. Economic Growth Challenges

In the workshops a special topic was economic growth strategy and associated strategy. Following observations and findings were made:

- (1) Countries that are able to save 15-20 % of GNP could grow at a much faster rate than those that save less;
- (2) The national capital-output ratio is negatively related to the economy's capital output ratio;
- (3) More saving and investments are needed. It is important to save part of the natural resource public revenue and invest the rest into productive assets. Moreover, strong investment climate in the non-resource sector, which may include carefully selected sector intervention needs to be created;
- (4) Financial and banking system must be developed;
- (5) Investments to energy and natural resource management are strategically very important for the economic growth of Lao PDR.

Strengthening governance in the hydropower and mining sector by doing the right projects (consistent with capacity) and doing the projects right (social and environmental sustainability) are vital issues to consider. The number and size of the projects need to be matched to aspirations and implementation capacity. The projects need to be consistent with the NSEDG goal of preserving natural resources and protecting the environment. Important is to select projects with the best outcomes maximizing revenues or development contribution while minimizing environmental, social, and cumulative impacts. To implement projects right, it is important to get the right contractual framework, which is being built on existing good practice. Moreover projects need to be planned, implemented and managed effectively to deliver local benefits and to manage impact on environment. Monitoring and oversight of socio-environmental impact (risks and opportunities) is a vital issue when implementing natural resources development projects. A comprehensive ap-

proach to natural resource development (accounting for social and environmental cumulative impacts) needs to be adopted.

Benson et al. (2014) emphasize that there is need to mainstream environmental and climate policy into development policy, planning and budgeting. One direct social benefit is that the government can progress pro-poor and equitable development. Other co-benefits are (1) more transparent decision making and (2) better cross-government working. By the help of participatory foresight workshop processes these kinds of benefits can be economically considerable and very concrete. Mainstreaming does not happen automatically. There are needs for concrete actions and insightful decision making which lead to increased awareness, changed perceptions and improvements in the way inter-sectoral decisions are made.

3.3. Needed Development Policy Portfolios: Capacity Development

In the workshops a special topic investment portfolio(s) and associated capacity development were discussed. Following observations and findings were made:

- (1) Integrated planning models of the Government and business sectors (e.g. Integrated water management);
- (2) Competence building in risk management expertise of sector ministries;
- (3) Integrated knowledge management systems by using modern ICT competences and data banks;
- (4) Future Oriented Urban Master Plans for the biggest cities of the Lao PDR; and
- (5) Industrial and manufacturing plan for the Lao PDR.

With better partnerships it may easier to build capacity and create dynamic capabilities. Dynamic capability is defined by Teece et al. (1997, 516) as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". Because of changing global decision environment(s), also governments, public agencies and NGOs need to create dynamic capabilities. Comparative advantages are not stable variables (UNDP 1997 in Bontenbal 2009, 10;, Helfat et al., 2007; Teece 2009; Barreto, 2010). Especially creating of dynamic capabilities requires new kinds of collaborative management skills and competences. Partnerships and dynamic capabilities need to be developed "hand in hand" (see e.g. Helfat and Peteraf, 2009).

In the case of the Lao PDR there are many different kinds of needs to develop dynamic capabilities because of expected industrialisation and urbanization process. Our workshop findings indicate that donors and investors should link investment portfolio decisions to the development strategy of dynamic capacities.

4. FORECASTING SCENARIO ANALYSES BY IFS MODEL AND RESULTS OF PARTICIPATORY FORESIGHT WORKSHOPS

This section 4, we are reporting key economic and societal trends of Lao PDR till 2050. The aim of this section is to provide such long-run baseline scenario analyses, which help Laotian planners and key stakeholders to scale their planning activities and allocate critical resources to the most critical planning “puzzles”, such are structural economic changes, urbanization and expected demographic changes. We are also reporting demographic scenarios for the provinces of Lao PDR and energy scenarios. We are also linking these scenario analyses to the findings of participatory foresight workshops.

4.1. Demographic Baseline Scenarios on the Basis of IFs Model

In this section we present *predictive scenarios*, which are based on IFs model forecasts. These scenarios are not explorative or normative (see e.g. Börjeson et al., 2006).

In Fig. 4.1.1, baseline scenario of population in Laos is plotted out. If this scenario will be realized in 2050 population in Lao PDR will be almost 10 million people. Already in 2025 there will be about 8 million people in the Lao PDR.

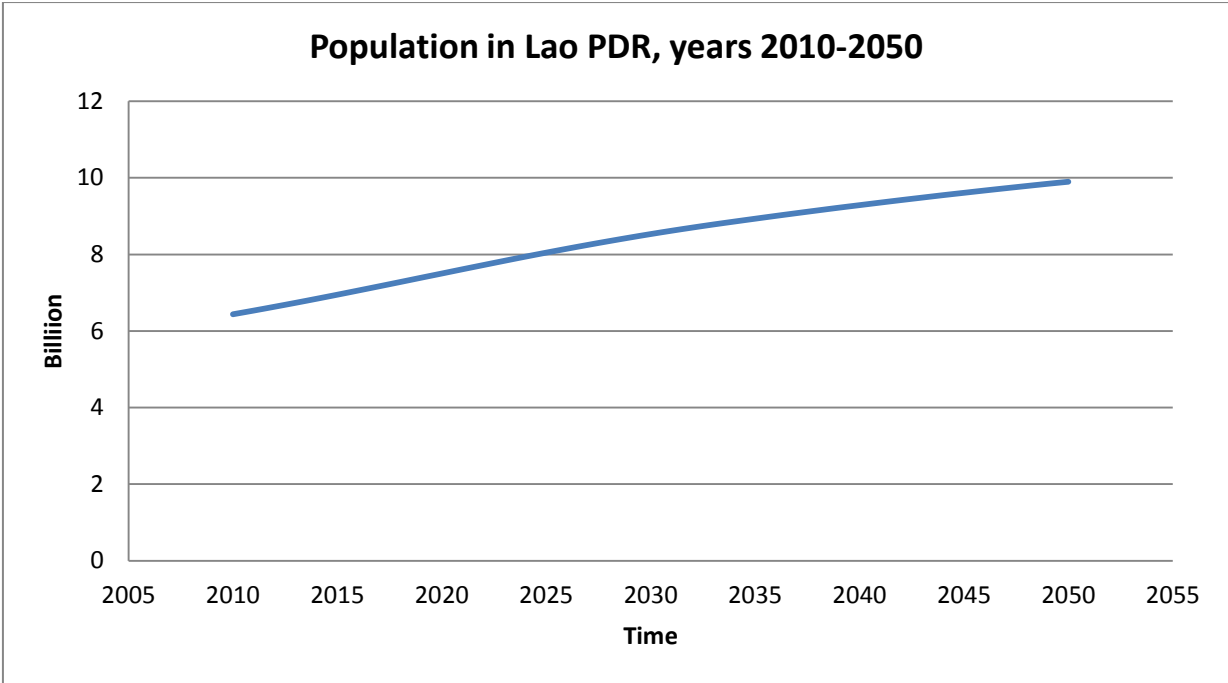


Figure 4.1.1. Population in Lao PDR, years 2010-2050 (IFs Baseline Scenario 2013).

Fig. 4.1.2 visualises crude birth rate and crude death rate in Laos. In the Lao PDR demographic change has been considerable in recent decades. The difference between crude birth rate and crude death rate was

in 1960 about 25% -units. Now in 2013 it is about 14% -units. In 2050 the difference is expected to be much less, about 5% -units.

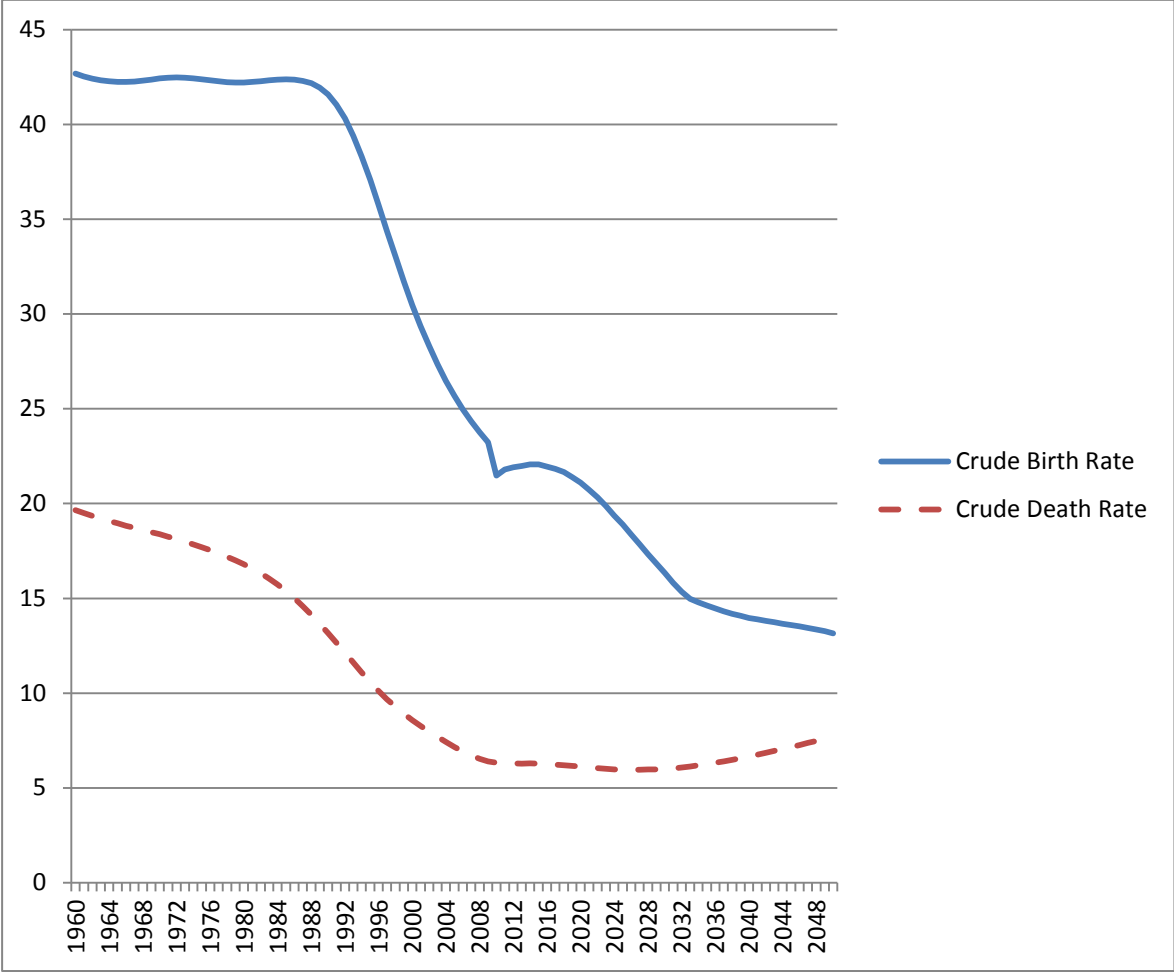


Figure 4.1.2. Crude birth and death rates in Lao PDR (IF Baseline Scenario, vers. 6.25).

In Fig. 4.1.3., baseline scenarios of the life expectancies of males and females in the Lao PDR have figured out. In next decades average life expectancy in Lao PDR is over 75 years in 2050, this baseline scenario analysis is correct. The life expectancy of women is in 2050 80 years and the life expectancy of men is about 75 years. The average life expectancy will increase by 10 years according to this baseline scenario.

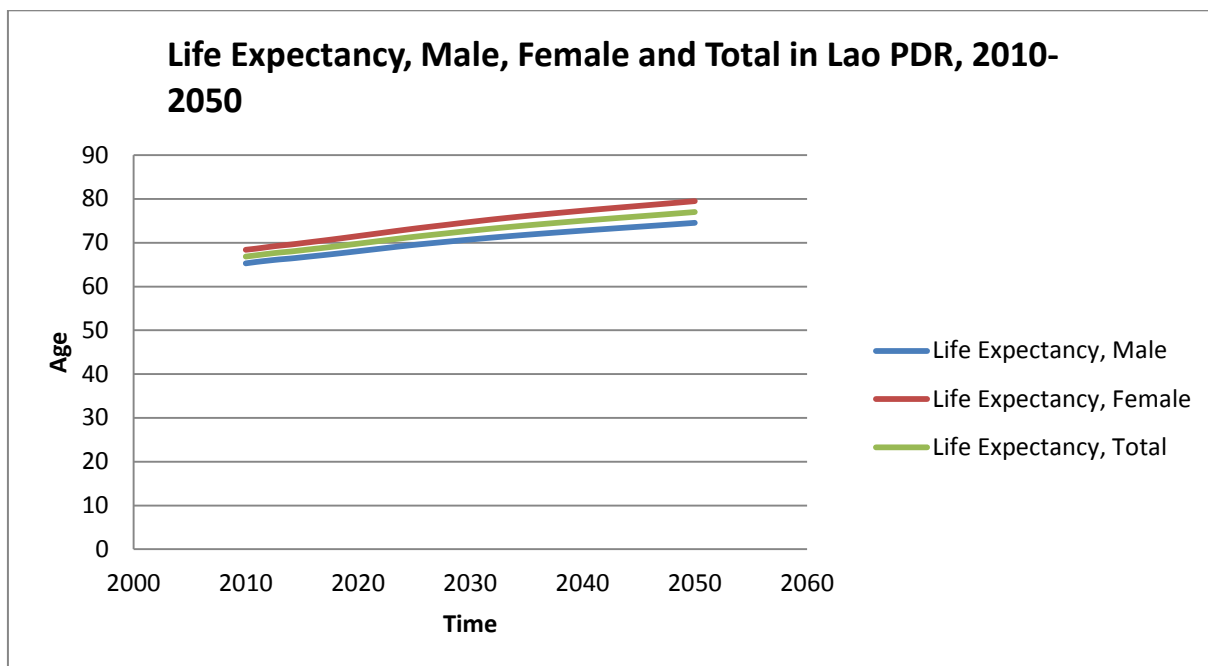


Figure 4.1.3. Life expectancy, male, Female and total in Lao PDR, Years 2010-2030 (IFs Baseline Scenario 2013).

In Fig. 4.1.4, median age of population is figured out till 2050. The Lao PDR is having a very young population, but average age increases rapidly. In 2050 it is estimated to be about 37 years. It is much higher compared to today situation (23 years).

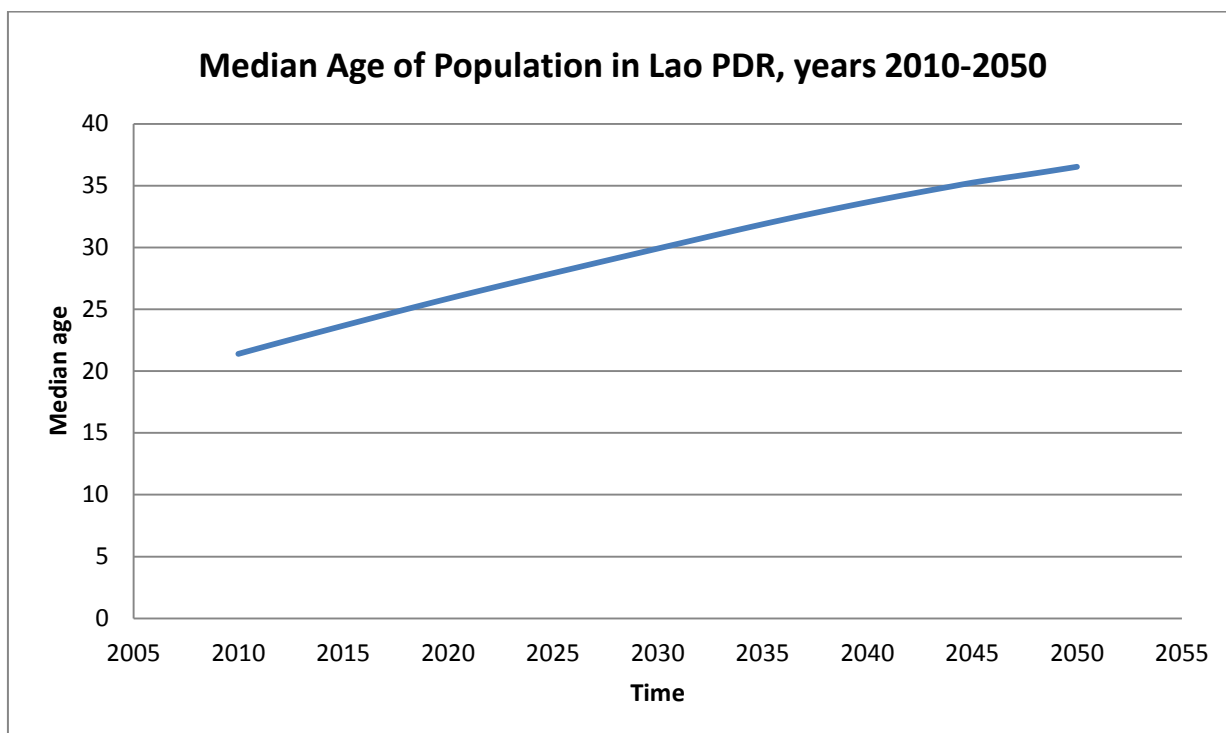


Figure 4.1.4. Median age of population in the Lao PDR, baseline scenario, years 2010-2050.

In Fig. 4.1.5, the baseline scenario path of the percentage of population 65 years old or more is visualised. Today the percentage of senior population is very small (4%), but in 2050 it will be much higher (11%) according to this baseline scenario analysis.

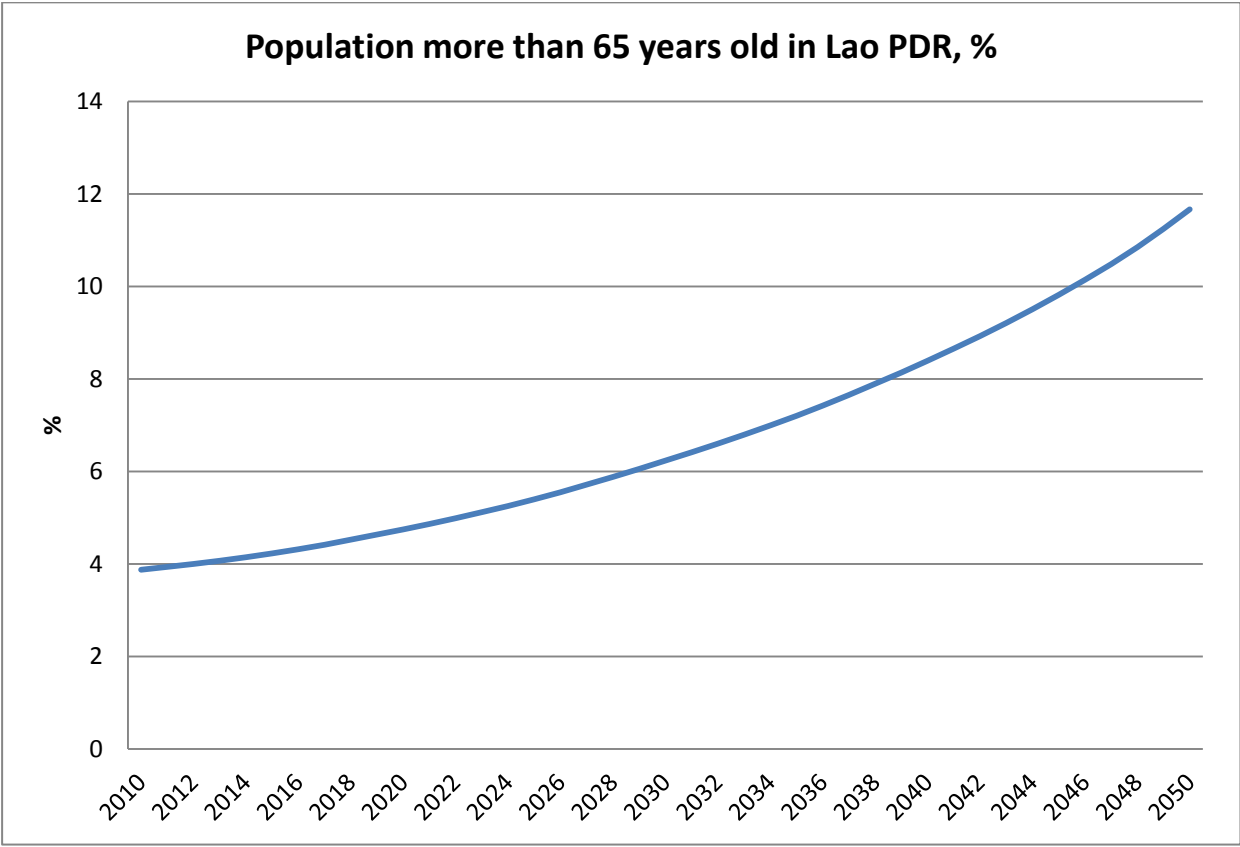


Figure 4.1.5. Population 65 years or more in Lao PDR (IF Baseline Scenario, vers. 6.54).

In Fig. 4.1.6, the expected population growth rate in the Lao PDR is visualised. The growth rate of population is going to decrease from 1,5% to 0,7%.

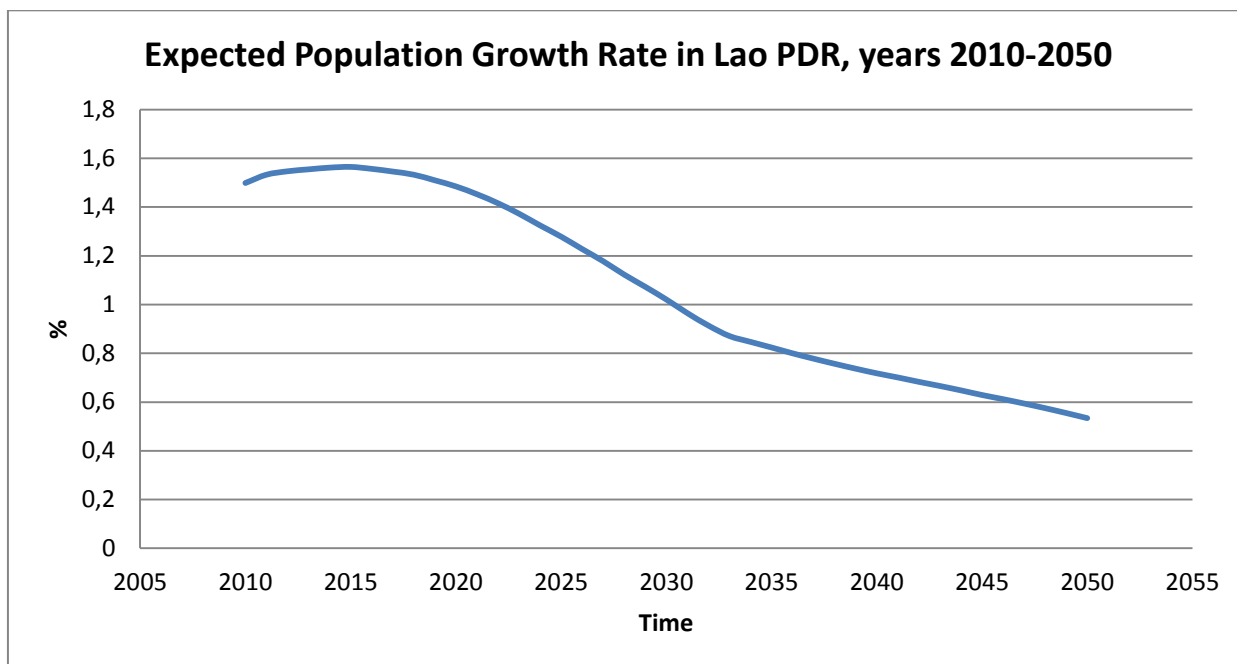


Figure 4.1.6. Expected population growth in Lao PDR, years 2010-2050 (IFs Baseline Scenario 2013).

In Fig. 4.1.7 the percentage of population in working age, 15-65 years old, as percentage of total population is figured out. This baseline tells us that demographic structure of the Lao PDR is very favourable during next decades. After year 2043, it turns down, but it is still very favourable before 2050.

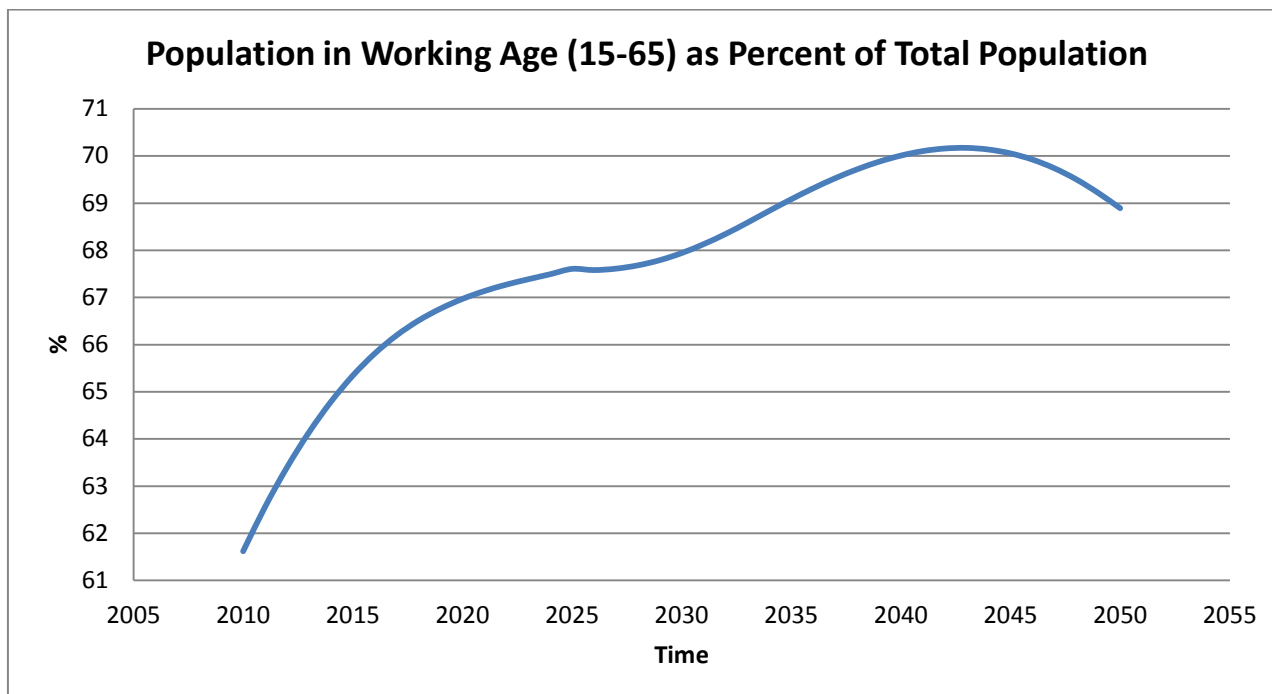


Figure 4.1.7 Population in working age (15-65 years) as per cent of total population (IFs Baseline Scenario 2013).

Fig. 4.1.8 includes the same basic message to us. The size of youth bulge is now about 45% in the Lao PDR. Before 2035, youth bulge is over 30%. In 2050 the youth bulge of Lao PDR is expected to be 27% according to the baseline scenario analysis.

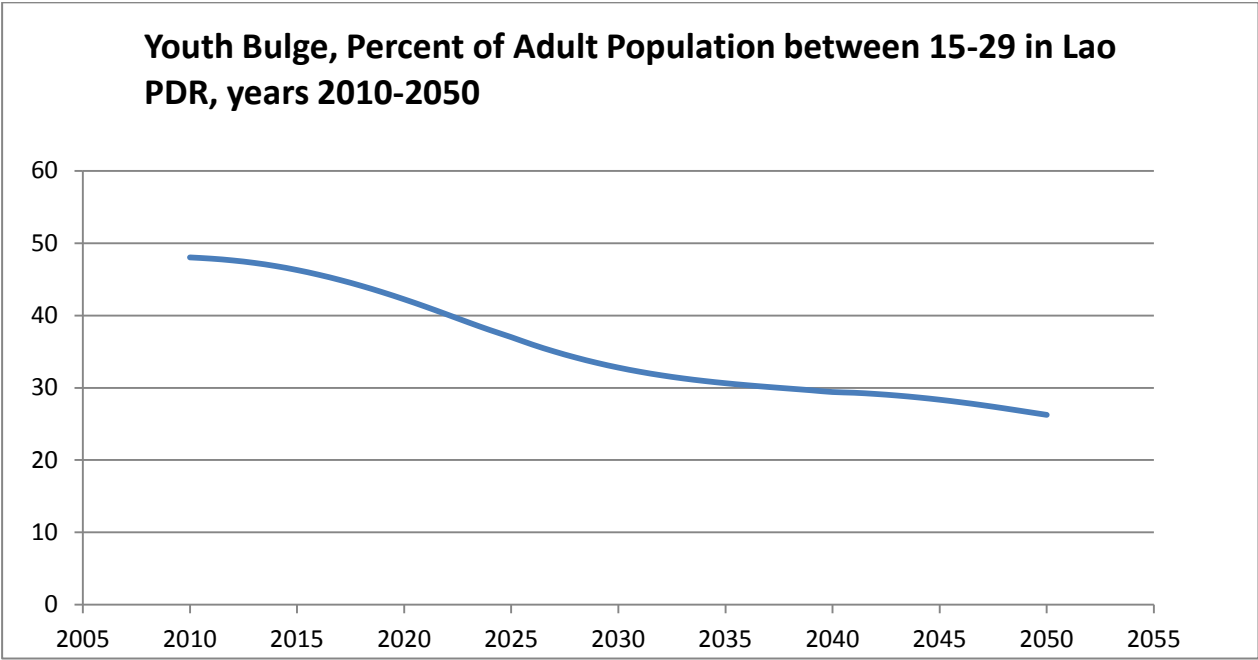


Figure 4.1.8. Youth bulge, per cent of adult population between 15-29 in Lao PDR, years 2010-2050 (IFs Baseline Scenario 2013).

4.2. Regional Dynamics of Demographic Change in the Lao PDR

In this section, a projection for demographic change during the next decades in Laos is presented.

Our projection is based on the output of a province-level population model constructed for Lao PDR. The model uses the age-specific population data, provided for Laos at the administrative province level in the 1995 and 2005 censuses, and the mortality, fertility and migration estimates provided by the 2005 census. From this data, the age-specific fertility, mortality and migration rates for each province have been estimated. The projection assumes a continuation of the trend of change for fertility and mortality rates that can be observed from the 1995 and 2005 censuses and a relatively slow rate of migration to the urban centers of Laos, especially Vientiane capital province, from the rural provinces. This information is used as input data for the provincial population model, which produces age-specific population tables for each province (see Steering Committee for Census of Population and Housing 2006).

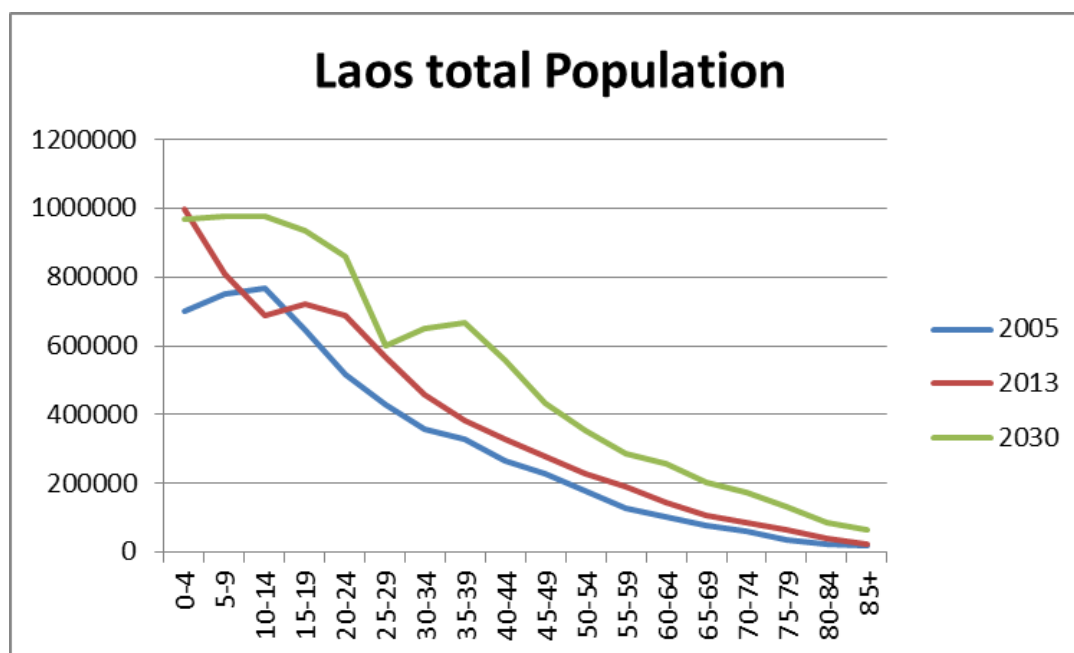


Figure 4.2.1. Change of age structure in Laos in 2005, 2013, 2030.

Fig. 4.2.1 shows the population structure in Laos as it was during the census of 2005, how it can be assumed to be in 2013 with the fertility and mortality observed in the census and how we project it to be in 2030. The picture illustrates that the demographic transition will still be in quite early stage in 2030 and the average population will be very young. The largest age cohorts are still under 25 years and the “demographic dividend” is to arrive fully only after 2030.

The total population of Laos and its provinces and the projection for year 2030 is presented in Table 1.2.1. The total population will rise to over 9 million by 2030 in our demographic model projection.

Table 4.2.1 Population in Lao PDR and its provinces in 2005, 2013 and 2030

	2005	2013	2030
Vientiane capital	698252	814921	1043969
Phongsaly	165923	199532	263067
Luangnamtha	145294	175831	234221
Oudomxay	265129	333158	479643
Bokeo	145222	176717	235282
Luangprabang	407005	503994	701879
Huaphahn	280902	357658	534529
Xayabury	338650	404793	516694
Xiengkhuang	229517	288057	415754
Vientiane province	428253	529252	717063
Borikhamxay	225267	283192	402814

Khammuane	337309	406518	546951
Savannakhet	825872	991579	1304040
Saravane	324307	394979	552808
Sekong	84993	103951	144503
Champasak	607330	713963	918269
Attapeu	112094	133285	175038
Total	5621319	6811380	9186524

Fig. 4.2.2 shows the changes of population structure for the Vientiane capital province. As Vientiane is the urban area receiving the majority of migrants from rural Laos, and because the fertility rates as well as mortality rates are clearly lower, the Vientiane capital province age structure is dramatically different from that of the other provinces or Laos as a whole. The demographic transition is much later stage in the Vientiane capital area than Laos in general. Migration flows that are likely to grow continue to expand the working-age population of Vientiane capital area in the future.

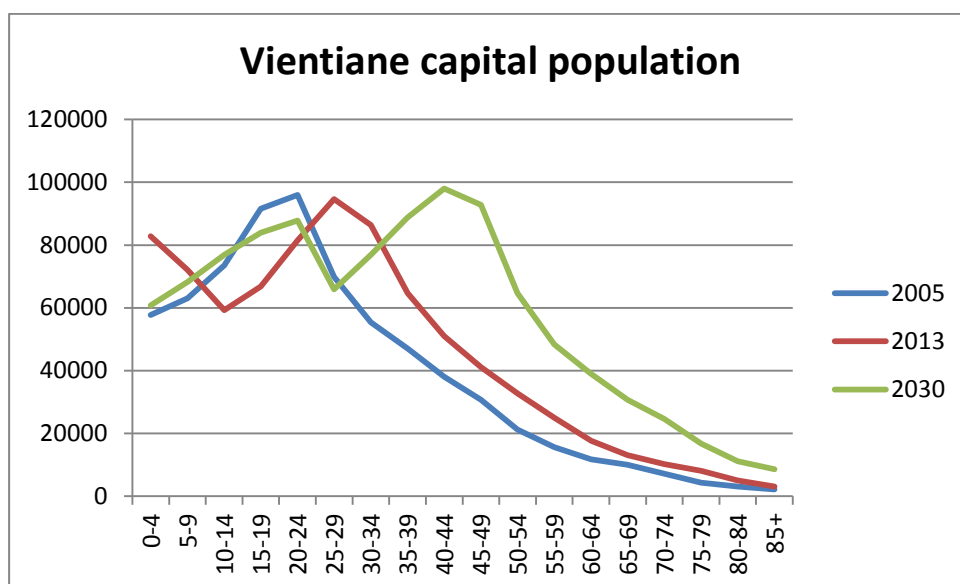


Figure 4.2.2. Change of age structure in Vientiane capital in 2005, 2013, 2030.

In Fig. 4.2.3 changes of age structure in Vientiane province (a census area surrounding the Vientiane capital) are shown in 2005, 2013 and 2030. This figure illustrates how the Vientiane province age structure is very close to the age structure of Laos as a whole. In 2030, if the migration rate will not be increased significantly, the province will have a bulge of population under 25.

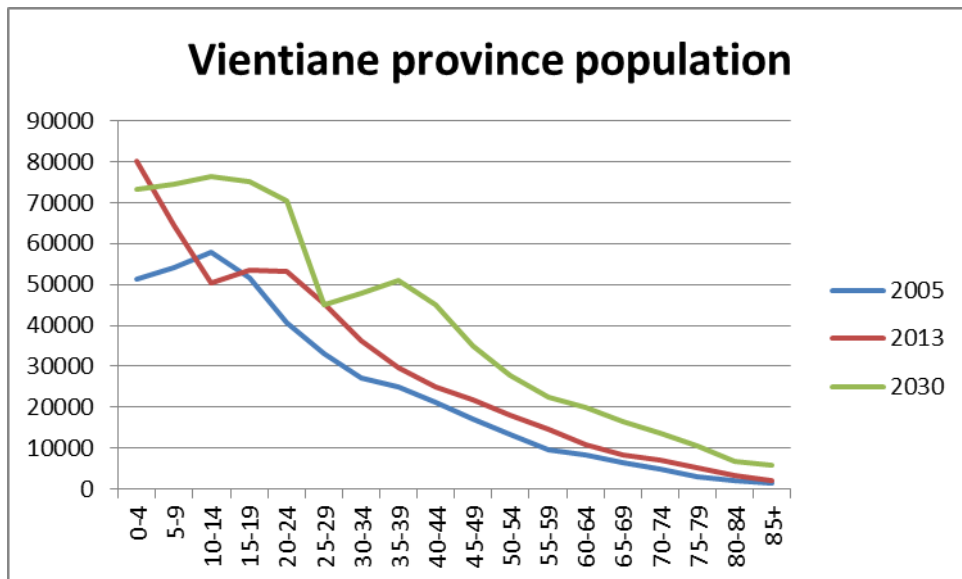


Figure 4.2.3. Change of age structure in Vientiane province in 2005, in 2013 and in 2030.

Figure 4.2.4 shows the age structure of Luang Prabang province in 2005, 2013 and 2030. Overall the demographic profile as well as demographic change in Luang Prabang follows the general profile and development in Lao PDR.

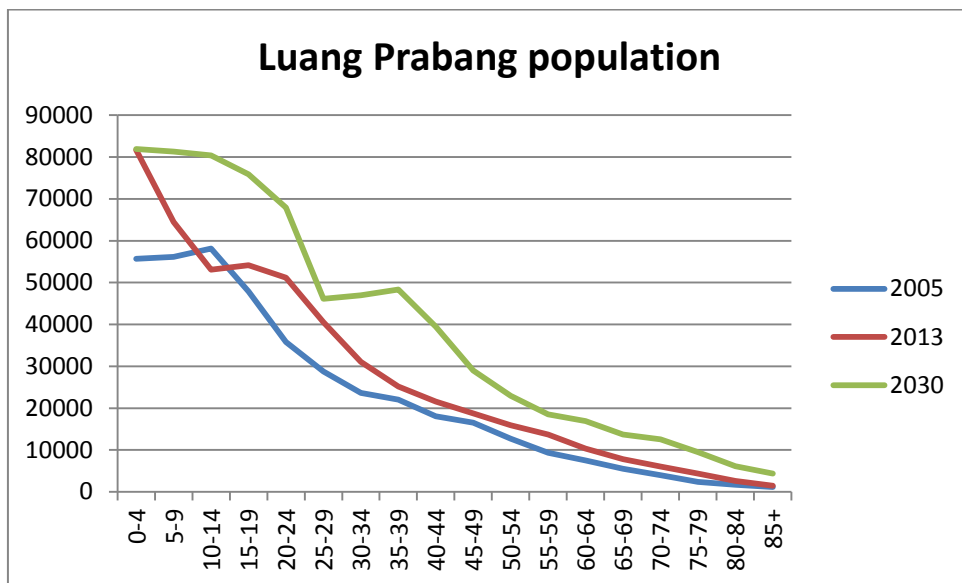


Figure 4.2.4. Change of age structure in Luang Prabang in 2005, in 2013 and in 2030.

In figure 4.2.5 age structure in Borikhamxay province are shown for 2005, 2013, 2030. This figure shows that population structure in Borikhamxay province is similar to the general population structure in Laos.

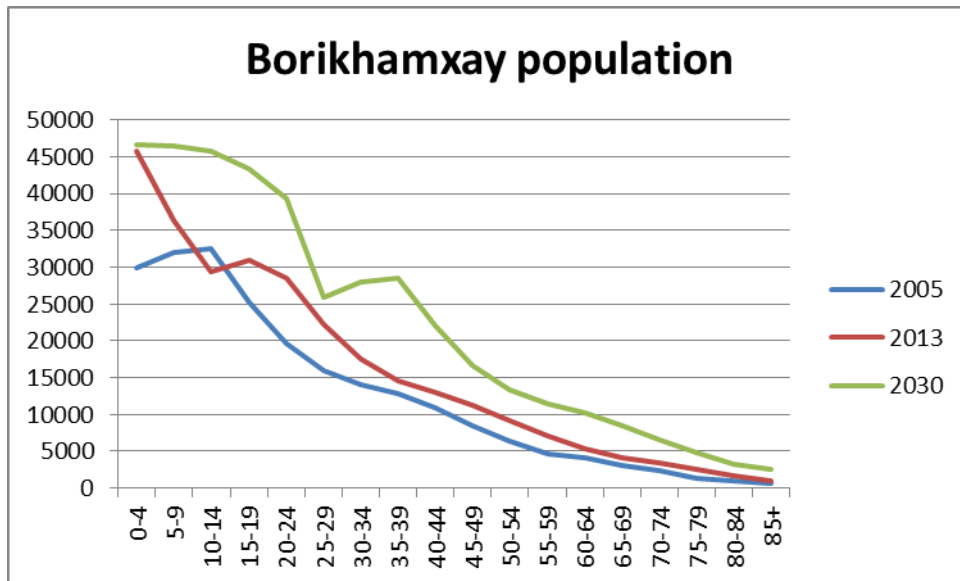


Figure 4.2.5. Change of age structure in Borikhamxay in 2005, in 2013 and in 2030.

In figure 4.2.6 age structure in Bokeo province are shown for 2005, 2013, 2030. Bokeo's population development from the point of view of demographic transition would appear to be somewhat slower than most provinces.

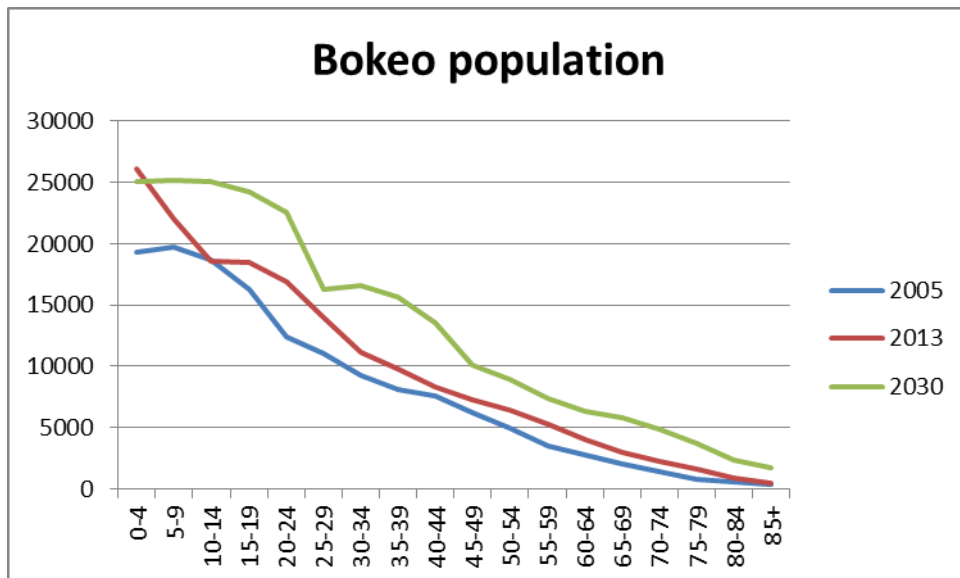


Figure 4.2.6. Change of age structure in Bokeo in 2005, in 2013 and in 2030.

In figure 4.2.7 age structures in Xiengkhuang province are shown for 2005, 2013, 2030. The demographic development in Xiengkhuang mostly follows the general development in Laos. The population growth is somewhat faster than average.

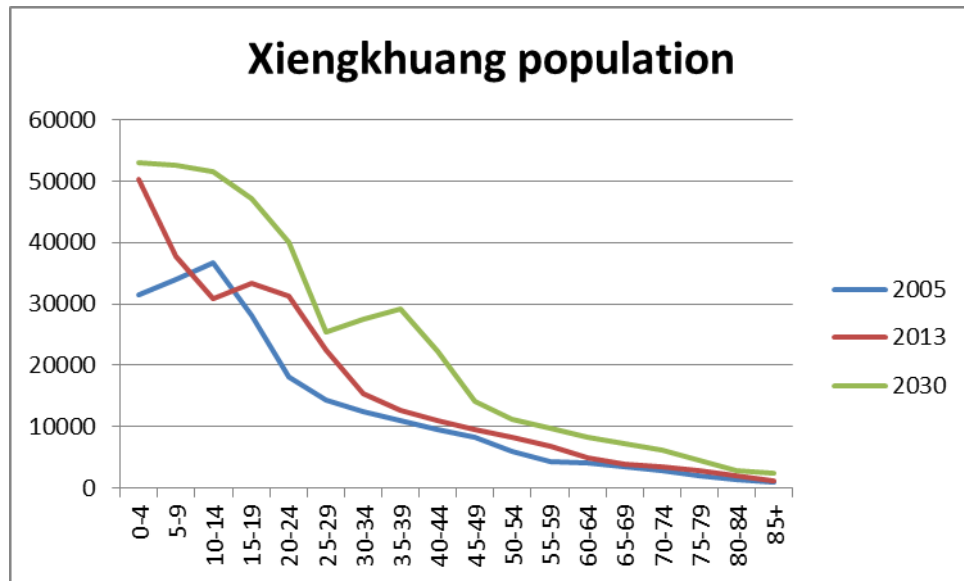


Figure 4.2.7. Change of age structure in Xiengkhuang in 2005, in 2013 and in 2030.

In figure 4.2.8 age structures in Huaphahn province are shown for 2005, 2013, 2030. The change of the age profile is somewhat similar to the change in Bokeo province: the demographic transition would appear to be advancing at a clearly slower pace than most provinces in Laos. Huaphahn is one of the poorest provinces in Laos and this is reflected also in the stage of demographic transition.

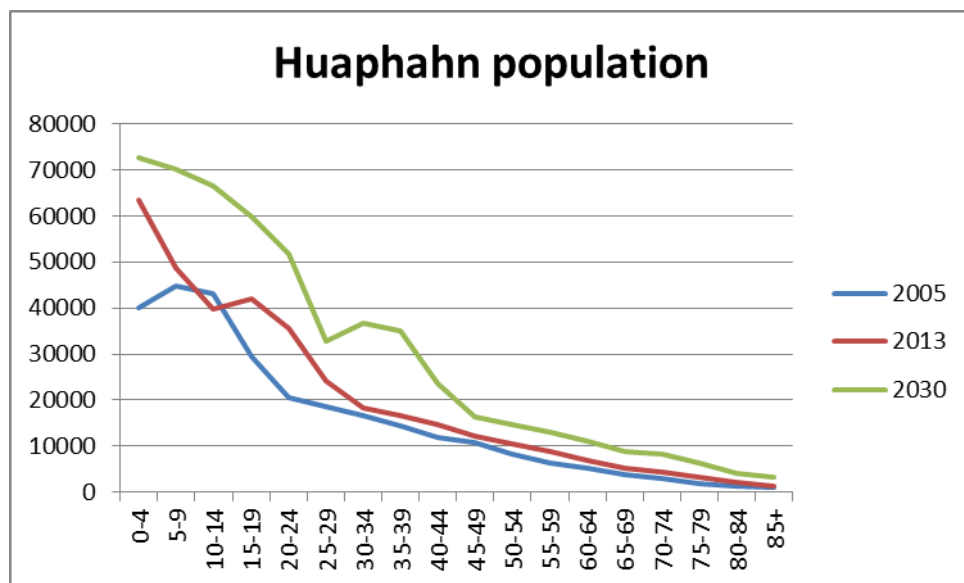


Figure 4.2.8. Change of age structure in Huaphahn in 2005, in 2013 and in 2030.

In figure 4.2.9 age structures in Xayabury province are shown for 2005, 2013, 2030. The age structure in Xayabury province is roughly similar to the other rural provinces of Lao PDR.

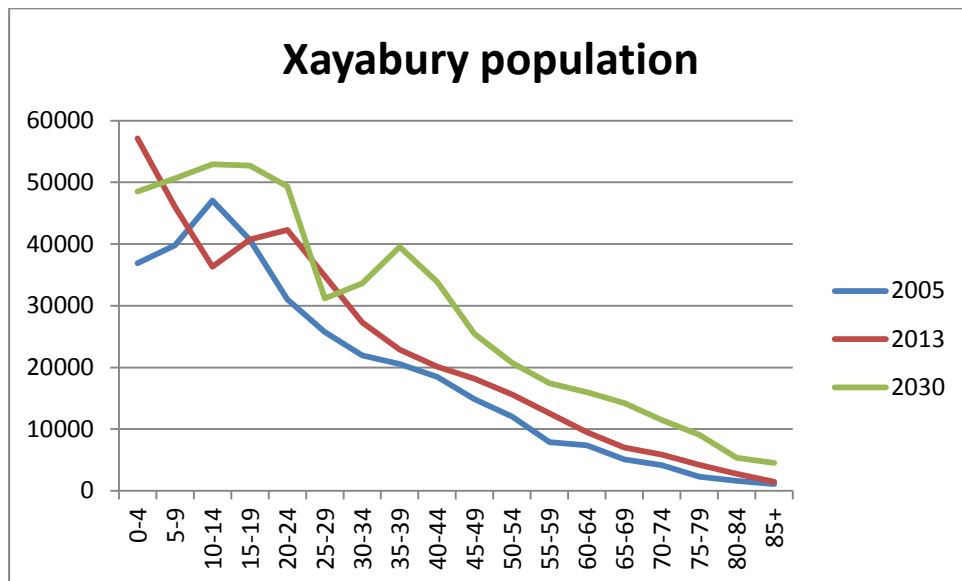


Figure 4.2.9. Change of age structure in Xayabury in 2005, in 2013 and in 2030.

In figure 4.2.10 age structures in Phongsaly province are shown for 2005, 2013, 2030. The change in Phongsaly is similar to the other, relatively poorer rural provinces in Laos and the demographic transition in 2030 is slightly behind the general stage of transition in Laos.

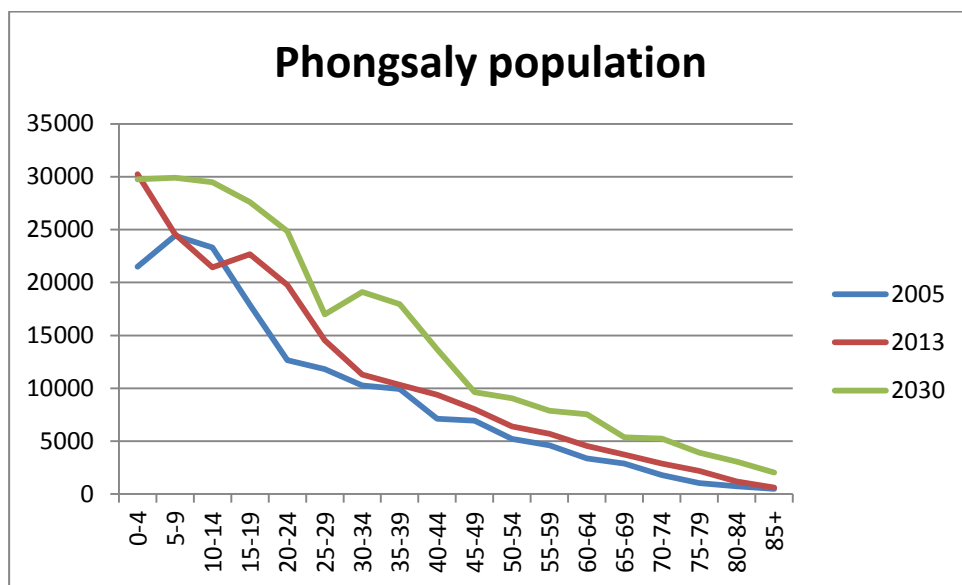


Figure 4.2.10. Change of age structure in Phongsaly in 2005, in 2013 and in 2030

In figure 4.2.11 age structures in Oudomxay province are shown for 2005, 2013, 2030. Generally the change in age structure in Oudomxay is similar to the general development in Laos.

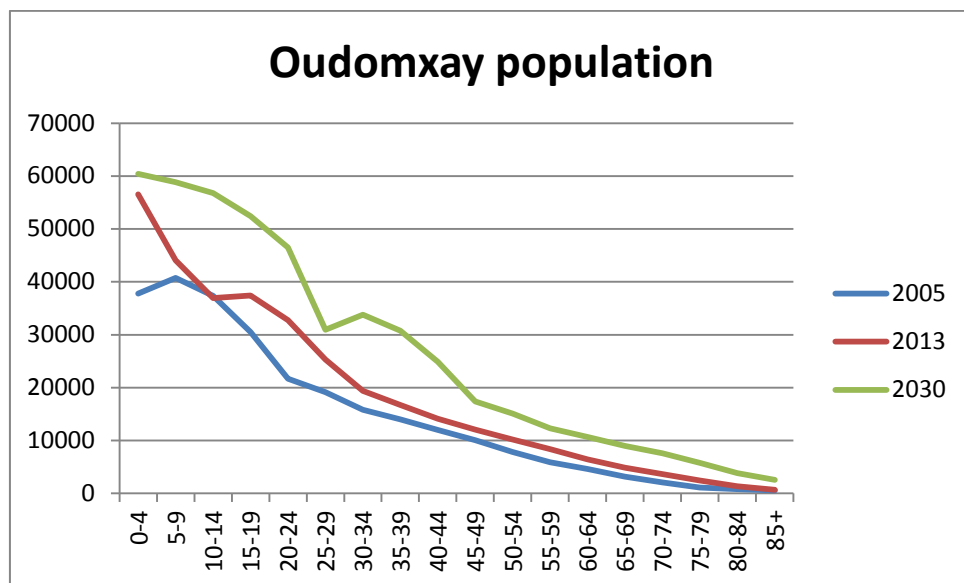


Figure 4.2.11. Change of age structure in Oudomxay in 2005, in 2013 and in 2030.

The change in Khammuane (illustrated in figure 4.2.12) is very similar to the change of age structure in Oudomxay and the other less affluent rural provinces in Laos.

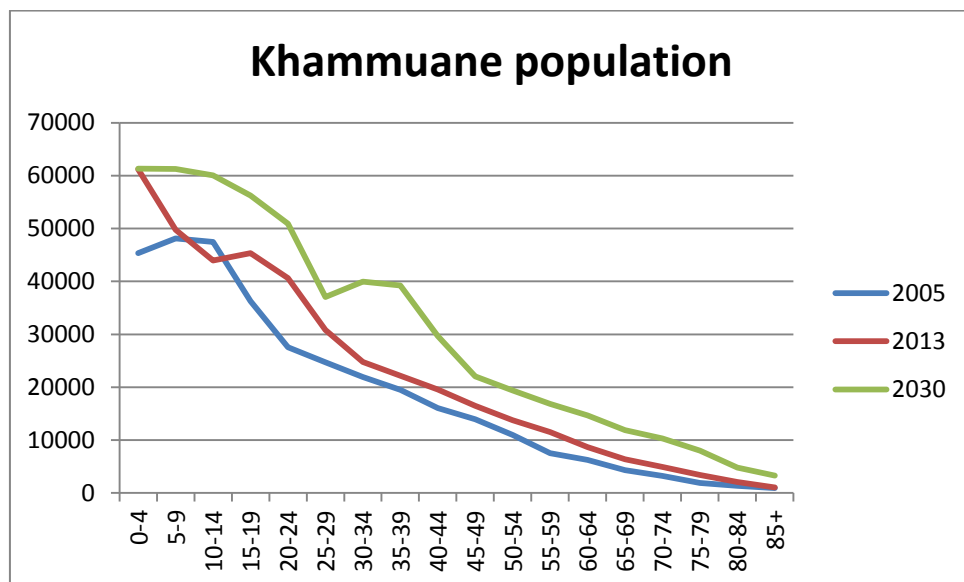


Figure 4.2.12. Change of age structure in Khammuane in 2005, in 2013 and in 2030.

In figure 4.2.13 changes of age structure in Savannakhet province are shown in 2005, 2013, 2030. The change in Savannakhet resembles the general change of the age structure of Laos closely.

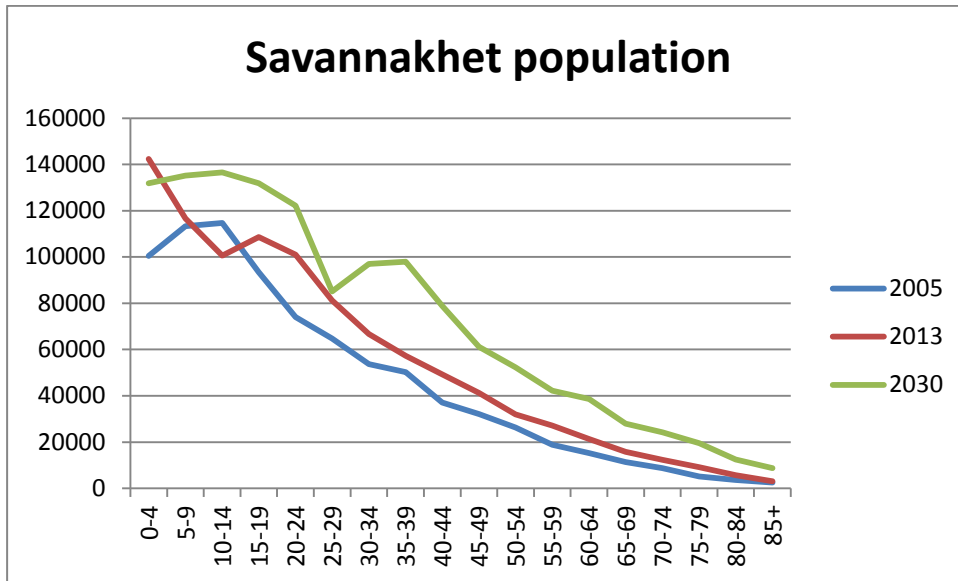


Figure 4.2.13. Change of age structure in Savannakhet in 2005, in 2013 and in 2030.

In figure 4.2.14 changes of age structure in Saravane province are shown for 2005, 2013, 2030. Saravane’s demographic transition is at early stages but happening at a relatively slow pace.

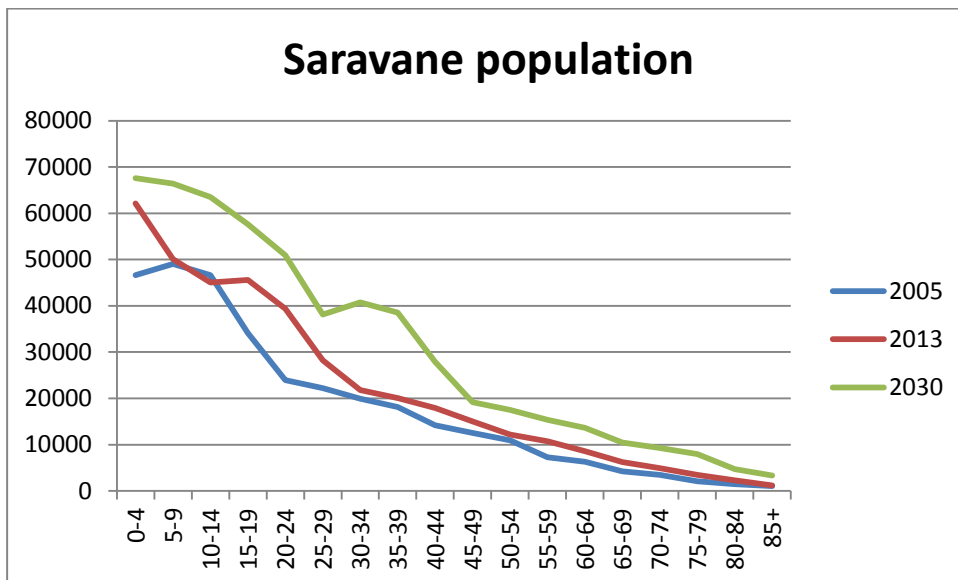


Figure 4.2.14. Change of age structure in Saravane in 2005, in 2013 and in 2030.

In figure 4.2.15 age structures in Sekong province are shown for 2005, 2013, 2030. Sekong stands out as one of the poorest provinces of Laos and is rather small in terms of population. The age structure is expected to remain mostly unchanged if no significant increase in migration rates occurs.

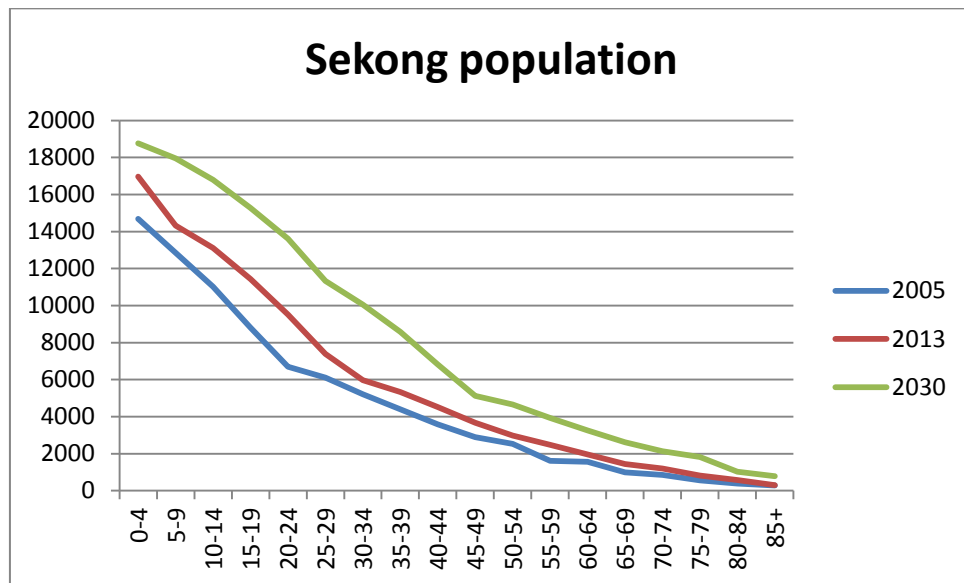


Figure 4.2.15. Change of age structure in Sekong in 2005, in 2013 and in 2030.

In figure 4.2.16 age structures in Champasak province are shown for 2005, 2013 and 2030. Champasak is expected to develop mostly along the average path of rural Laos.

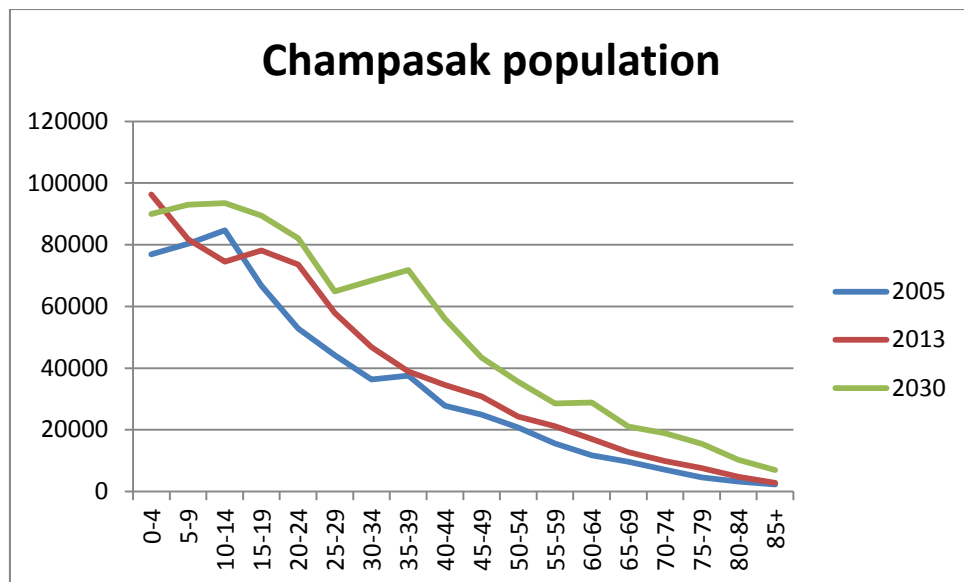


Figure 4.2.16. Change of age structure in Champasak in 2005, in 2013 and in 2030.

Figure 4.2.17 illustrates the projected change in the age structure of Attapeu province. Attapeu's development is quite similar to Sekong's, and the average age of population is still very low in 2030.

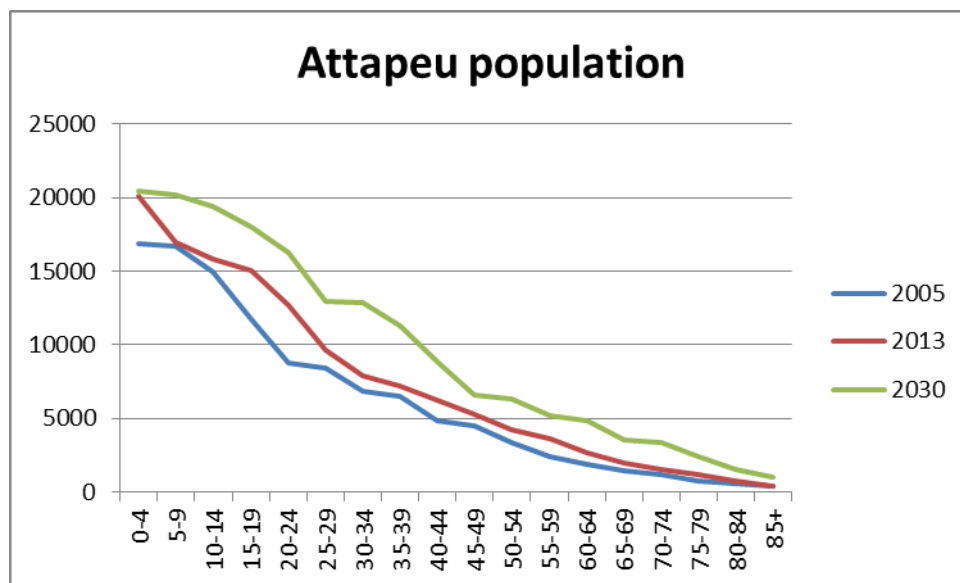


Figure 4.2.17. Change of age structure in Attapeu in 2005, in 2013 and in 2030.

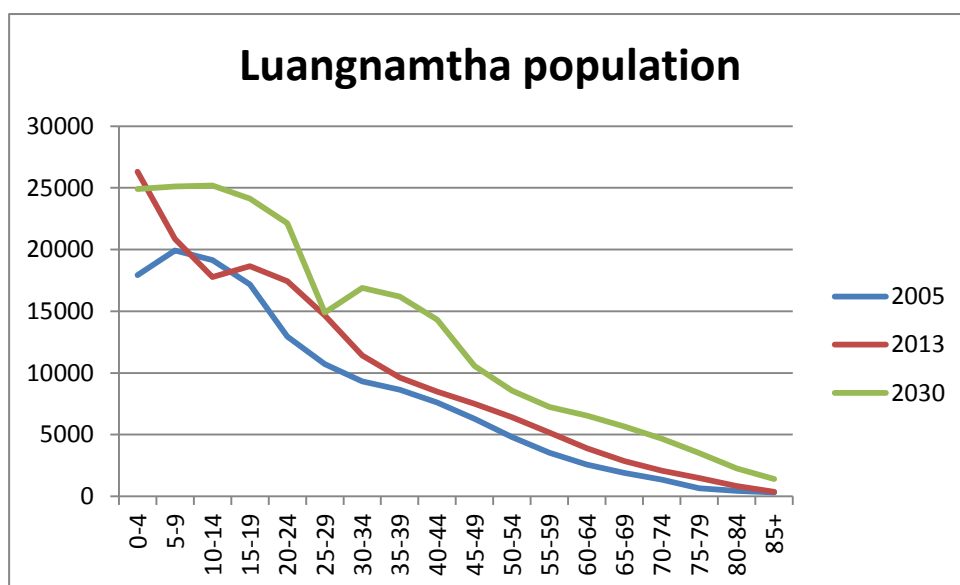


Figure 4.2.18. Change of age structure in Luangnamtha in years 2005, 2013 and 2030.

The change in the age structure of Luangnamtha is illustrated in Fig. 4.2.18. The province fits well the typical profile of a rural province in Laos on the demographic transition and age structure change.

As a summary, the capital Vientiane is going to have an age profile different from other provinces of Laos. This is due to lower fertility rates, but also a flux of migrants from rural parts of Laos. The migration rates assumed in this projection are based on the migration rates and trends reported in the 1995 and 2005 censuses. Some rise to the migration rates is assumed in the presented population projection, but much

higher migration rates could also be realistically expected. This would decrease the sizes of the youth bulges in the rural provinces and greatly increase especially the young working-age population in Vientiane capital.

From the point of view of dependency ratio, the supply of workforce and demographic dividend, the outlook for Laos is mostly favorable. The “best years” of the demographic dividend, with associated low dependency ratio and a big working-age population, are yet to come for Laos. Laos has the youngest population in Asia. The dependency ratio decreases consistently to year 2030 and beyond and the working-age population grow. The dependency ratio for Lao PRD is expected to be about 63 in 2030 and improving fast during the next decade.

We can expect that population density is going to increase in Lao PDR also in the future. In Fig. 4.2.19 we have visualised a long-run trend of population density in Laos.

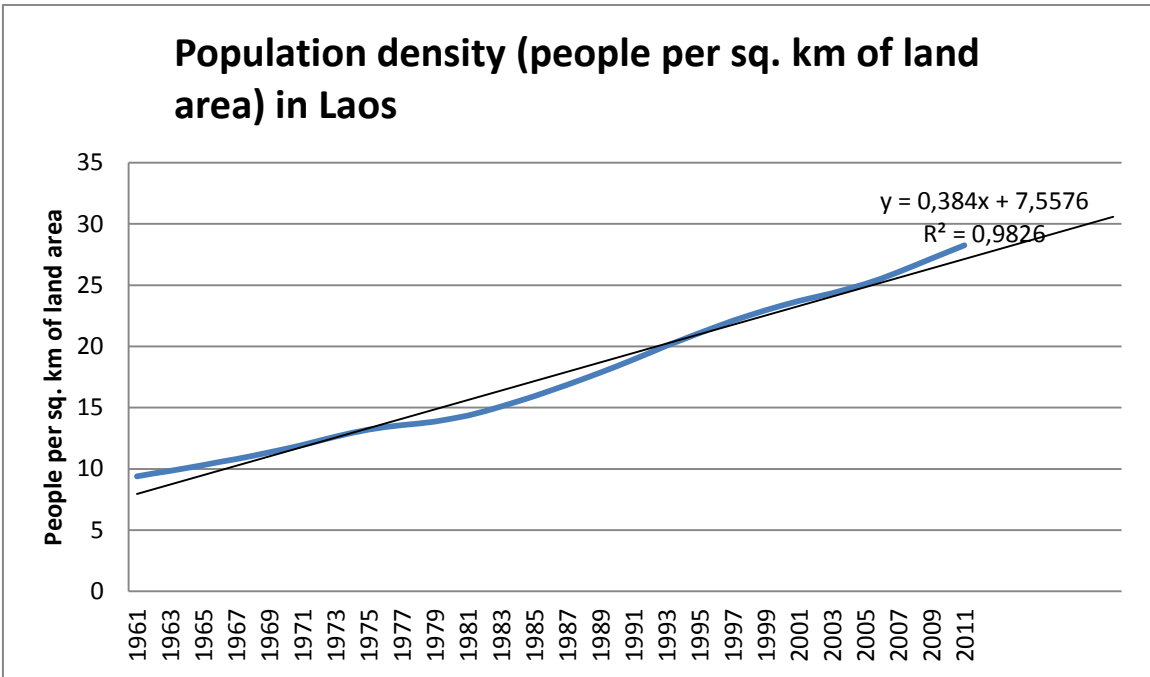


Figure 4.2.19. Population density in Lao PDR 1961-2011 (World Bank 2013).

We can expect that in 2020 population density in Laos will be over 30 people per sq km of land area.

In Fig. 4.2.20 we report age dependency ration for Laos in 1960-2011. These figures are based on Word Bank Laos Database (World Bank, 2013).

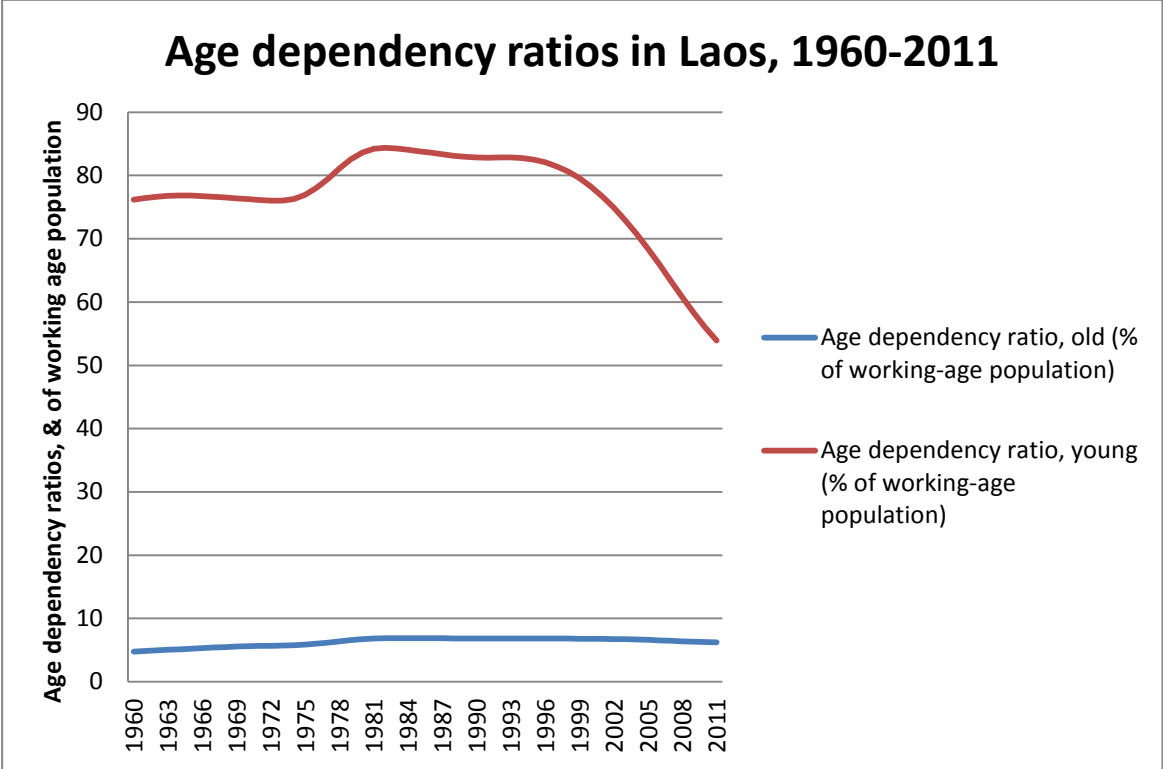


Figure 4.2.20. Age dependency rations in Laos, 1960-2011 (World Bank, 2013).

Fig. 4.2.20 illustrates that age dependency ratio of old population has decreased since 1993, but age dependency ratio of young people has been quite stable.

4.3. Economic Baseline Growth Scenarios and Other GDP-related Baseline Scenarios

In this chapter we are providing a set of economic growth scenarios for Lao PDR.

In Fig. 4.3.1 the baseline scenario of GDP is figured out for Lao PDR. If this baseline scenario will be realised in Laos, the country will be about 9 times wealthier measured by gross domestic growth in billions of US dollars.

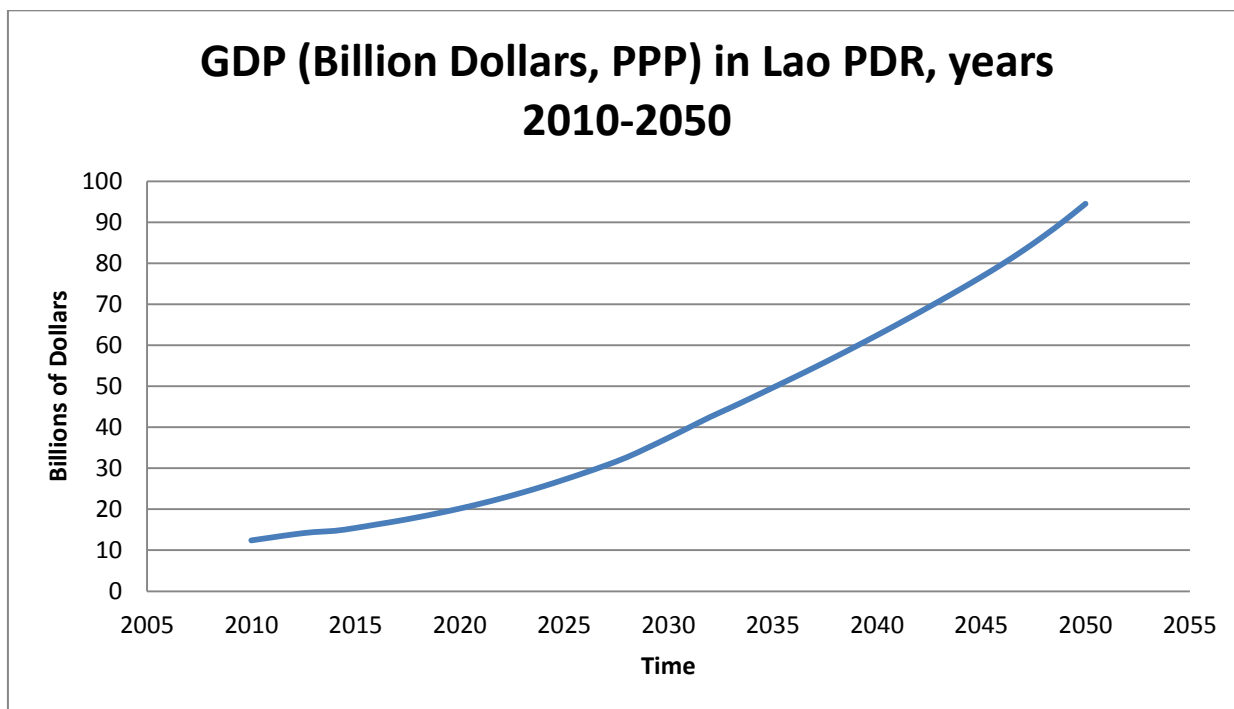


Figure 4.3.1. GDP (Billion Dollars, PPP) in Lao PDR, years 2010-2050, history and baseline scenario (IFs Baseline Scenario 2013).

In Fig. 4.3.2 development of GDP, gross domestic product of the Lao PDR is visualised. This figure indicates rapid modernization process in the Lao PDR. It is five times higher than current GDP level.

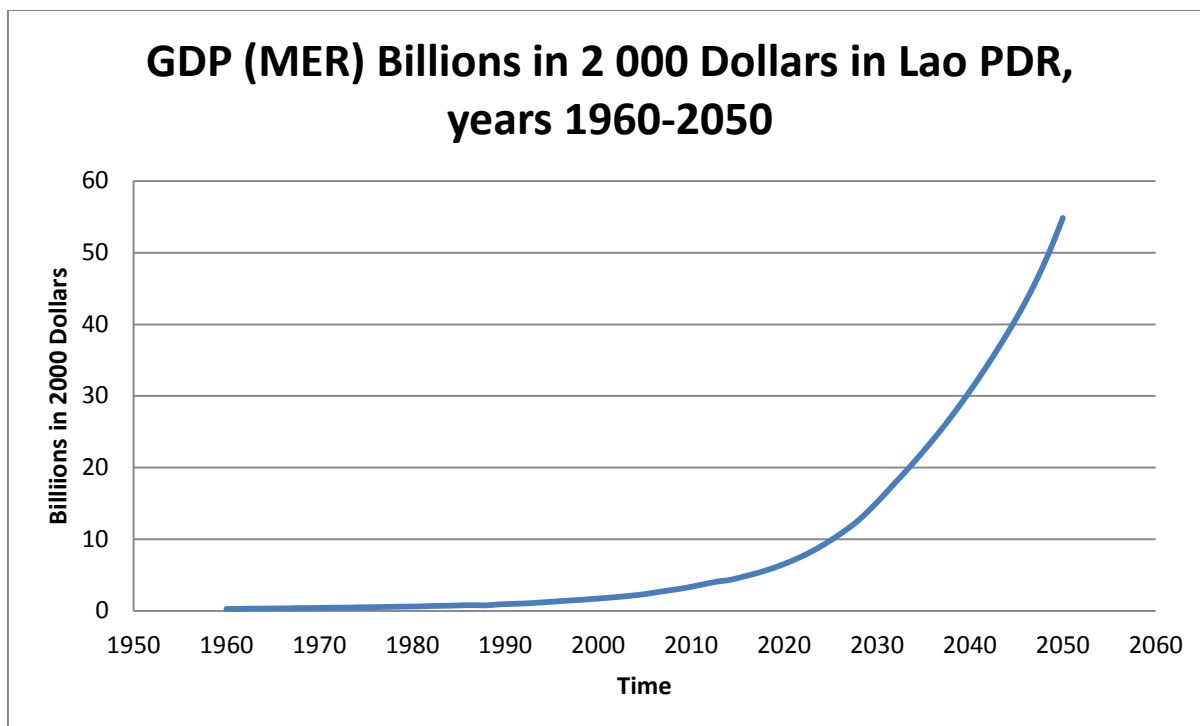


Figure 4.3.2. GDP (MER) Billions in 2 000 Dollars in Lao PDR, years 1960-2050, history and baseline scenario (IFs Baseline Scenario 2013).

Fig. 4.3.3 visualises baseline scenarios of GDP per capita developments. If this baseline scenario can be realized in Laos, average GDP (PPP) per capita will multiply four times compared to current level of GDP per capita.

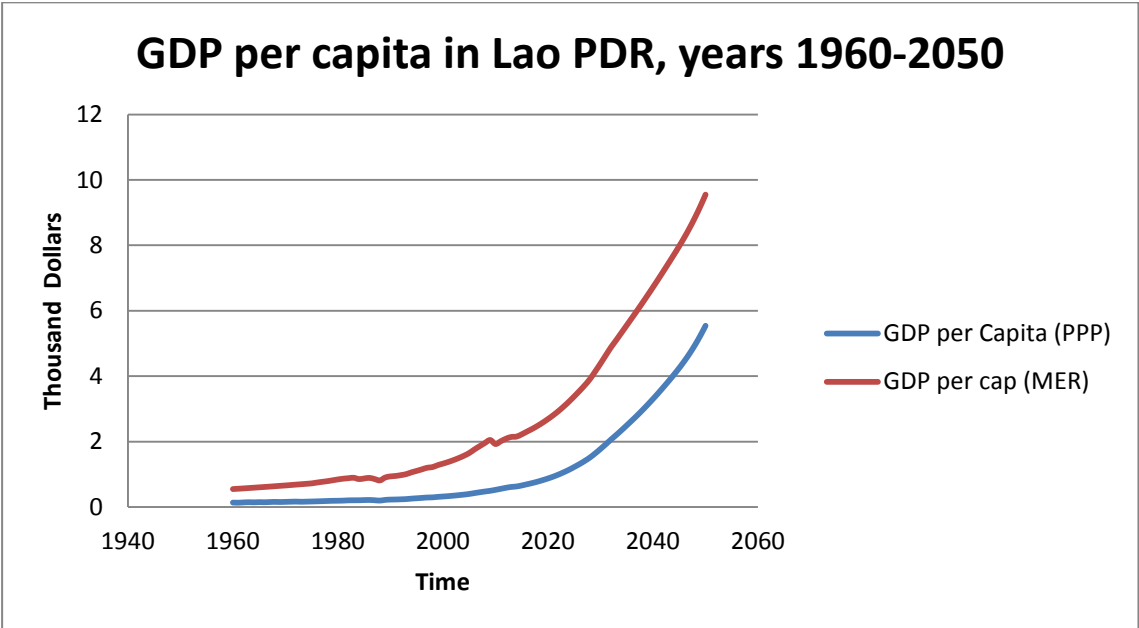


Figure 4.3.3. GDP per Capita in Lao PDR, years 1960-2050, history and baseline scenario (IFs Baseline Scenario 2013).

Fig. 4.3.4 figures out GDP growth rate in the Lao PDR. According to this baseline scenario we can expect that GDP growth rate will be very high in the Lao PDR till year 2030, which is expected to be a turning point. After 2030 growth rate will be little bit lower, reaching about 6% before 2050.

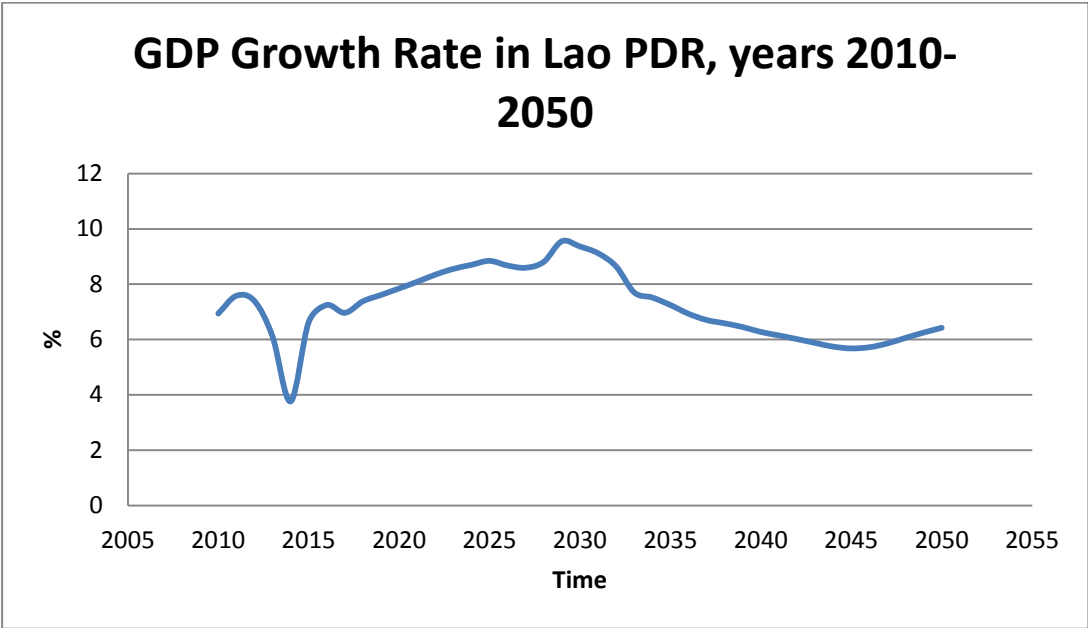


Figure 4.3.4. GDP Growth Rate in Lao PDR, years 2010-2050, history and baseline scenario (IFs Baseline Scenario 2013).

In Fig. 4.3.5 reports the baseline scenario of foreign direct investments as % of GDP in the Lao PDR. This figure tells to us that the volume of FDIs will be very high in relation to GDP in the Lao PDR.

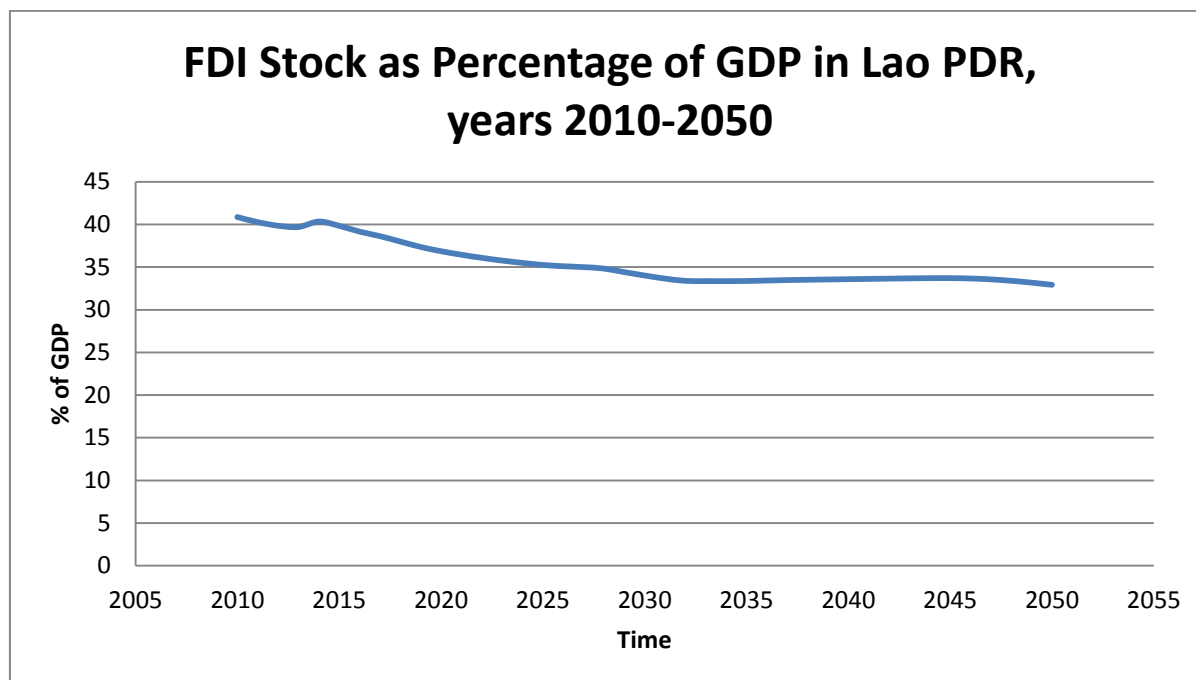


Figure 4.3.5. FDI Stock as percentage of GDP in Lao PDR, years 2010-2050, history and baseline scenario (IFs Baseline Scenario 2013).

In Laos, foreign aid as % of GDP is expected to decrease. This is natural development because the Lao PDR is expected to be much wealthier nation in the future. Figure 4.3.6 illustrates this baseline scenario.

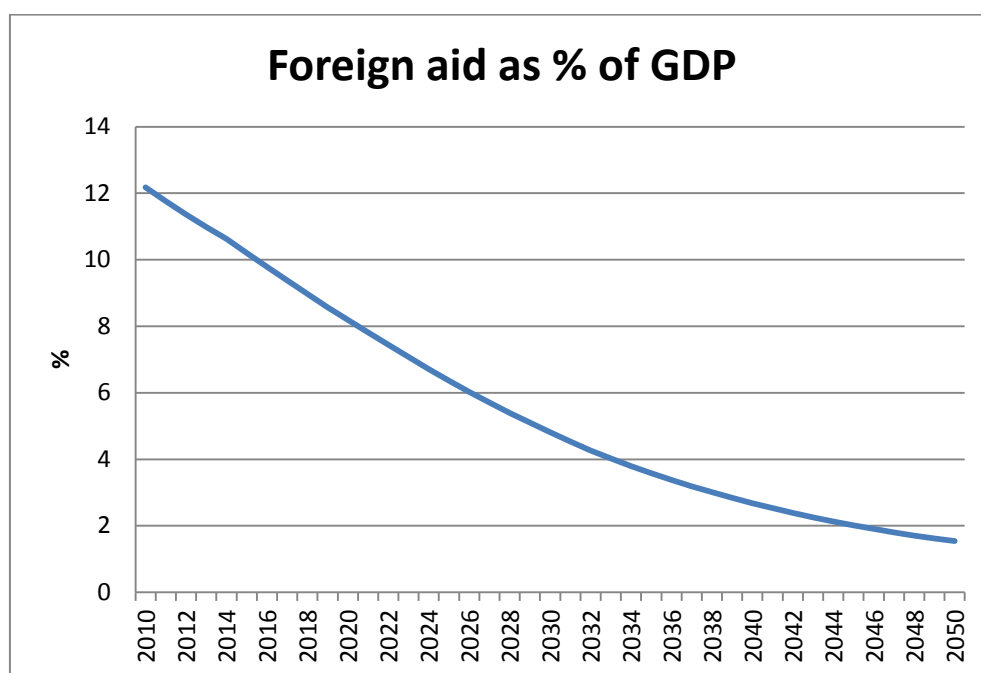


Figure 4.3.6. Foreign aid as percentage of GDP in Lao PDR, history and baseline scenario (IF Baseline Scenario, vers. 6.54), years 2010-2050.

Fig. 4.3.7 visualises the baseline scenario of trade % of GDP in the Lao PDR. This baseline scenario indicates that the role of trade increases dramatically in Laos. In this figure trade includes both export and import volumes. Probably deepening economic integration in the ASEAN region will explain this kind of economic dynamics.

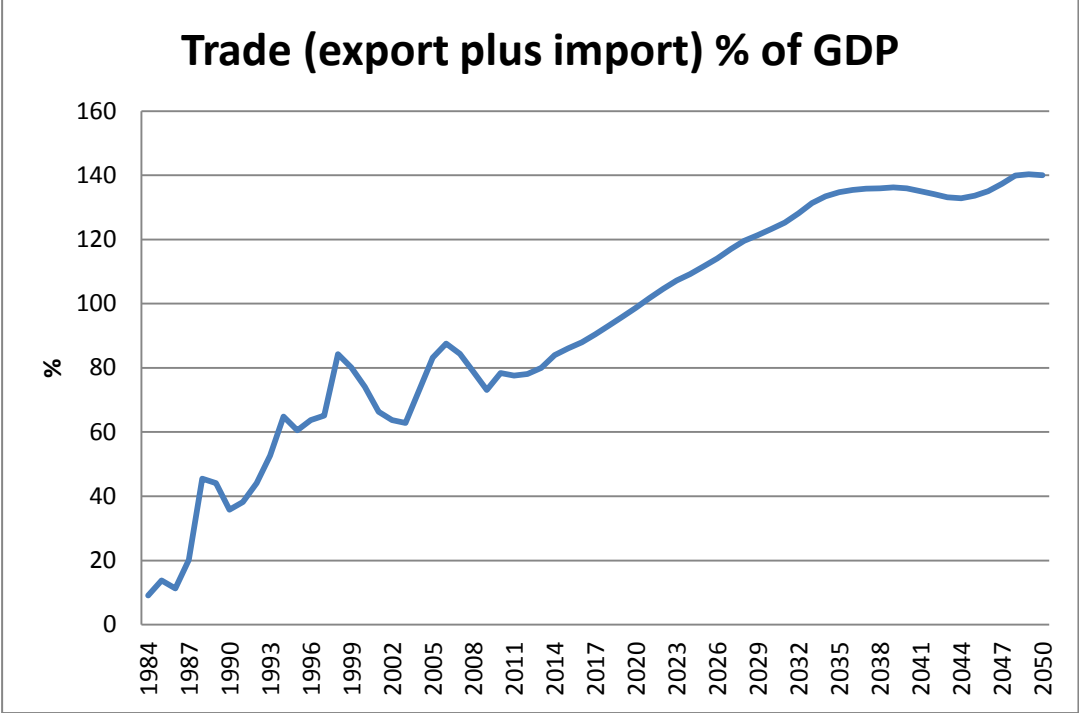


Figure 4.3.7. Trade (export plus import) % of GDP, history and baseline scenario, history and baseline scenario (IF Baseline Scenario, vers. 6.54).

Fig. 4.3.8 shows the baseline scenario of export percentage of GDP in the Lao PDR. Also this baseline scenario is indicating considerable growth of export trade.

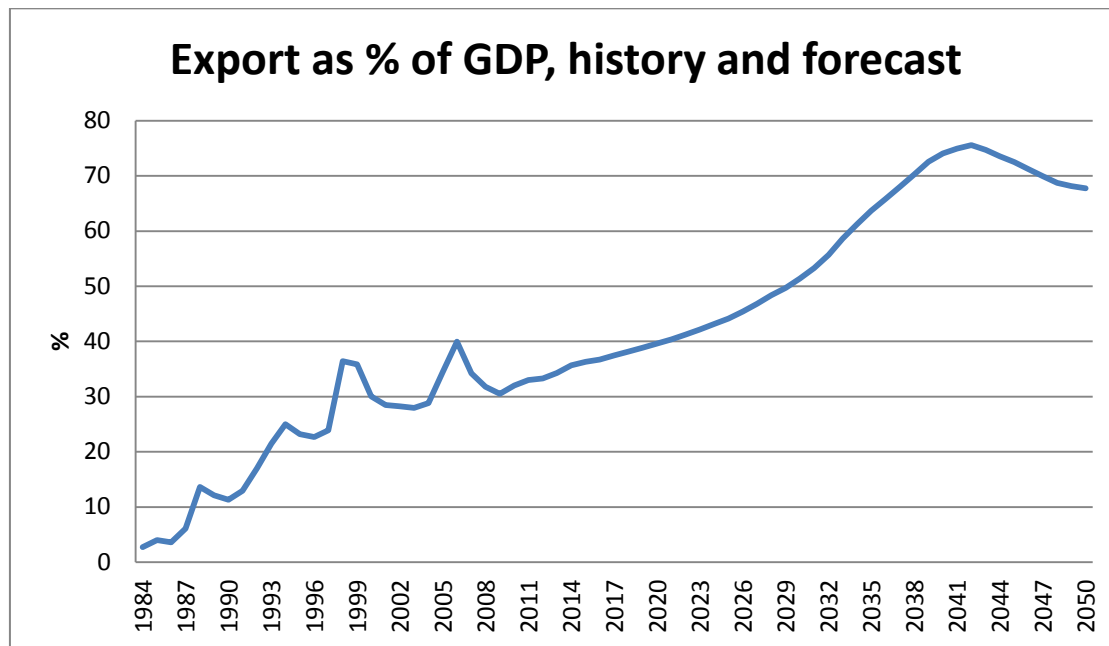


Figure 4.3.8. Exports as percentage of GDP, history and baseline scenario (IF Baseline Scenario, vers. 6.54).

Fig. 4.3.9 shows the baseline scenario of import percentage of GDP in the Lao PDR. Also this baseline scenario is indicating considerable growth of import to the Laotian economy.

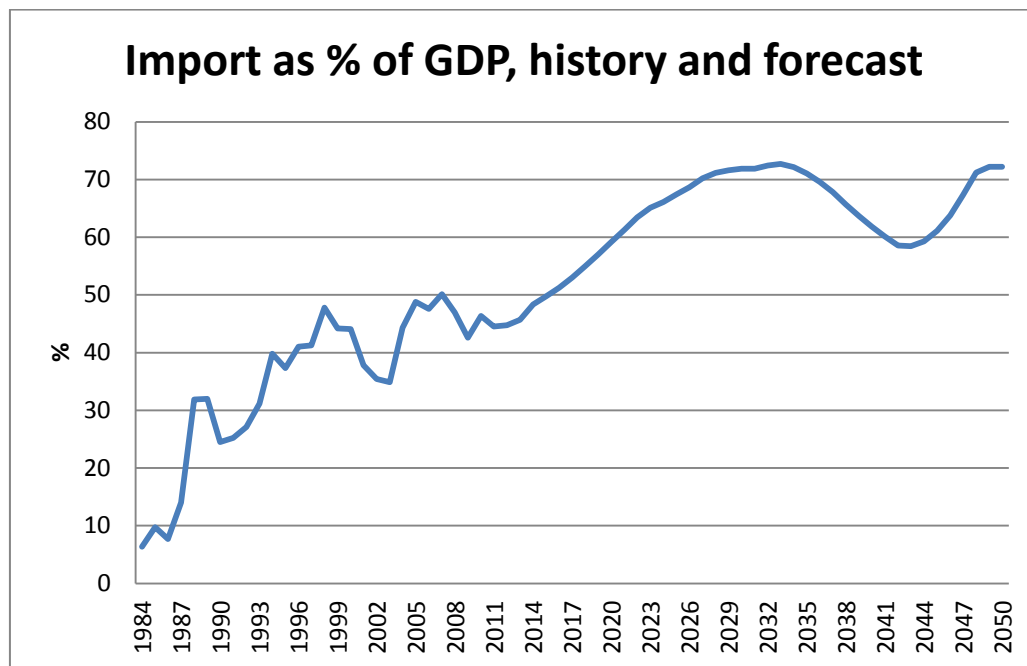


Figure 4.3.9. Imports as percentage of GDP, history and baseline scenario (IF Baseline Scenario, vers. 6.54).

Fig. 4.3.10 illustrates current account as percent of GDP in the Lao PDR. This is a robust baseline scenario and indicates that there can be serious trade balance problems in Laos. There is a need to pay a special political attention to trade balance challenge in the long run planning of the Laotian economy.

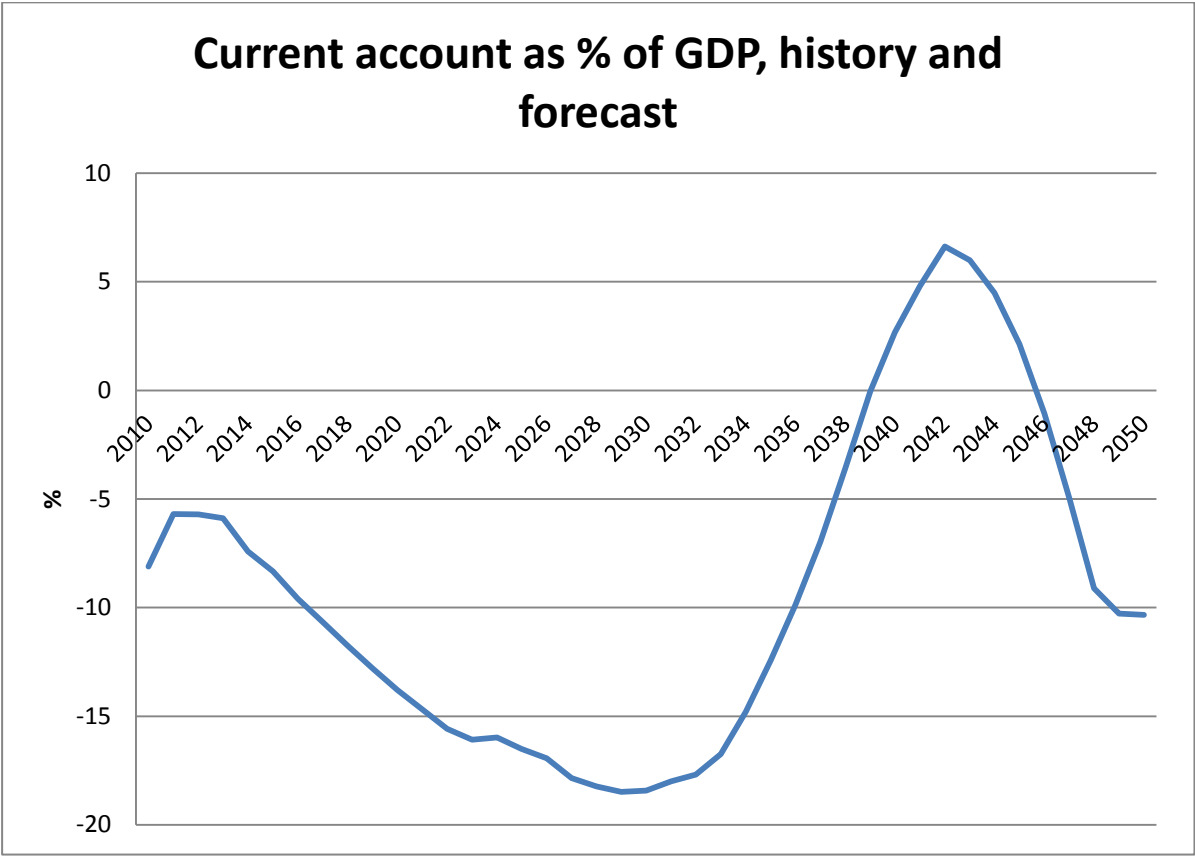


Figure 4.3.10. Current account as per cent of GDP in Lao PDR, history and baseline scenario (IF Baseline Scenario, vers. 6.5).

Fig. 4.3.11 illustrates Human Capital Productivity in Lao PDR, history and baseline scenario.

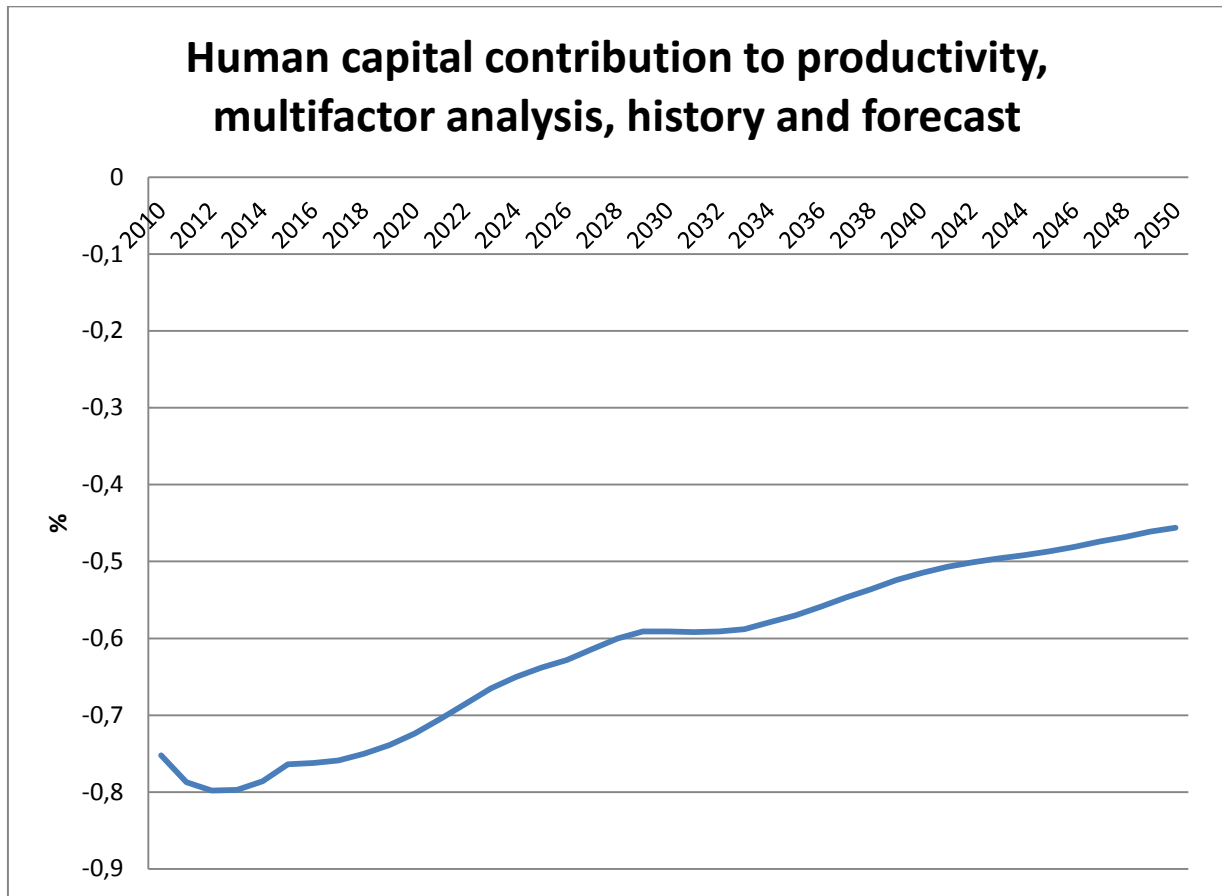


Figure 4.3.11. Human capital productivity in Lao PDR, history and baseline scenario (IF Baseline Scenario, vers. 6.54).

As the above Fig. 4.3.11 illustrates investing in education affects positively to human capital productivity. In a recent World Bank survey in Laos, businesses said that their biggest constraint to growth was finding adequately educated workers. Equipping Lao workers with such capabilities is not done overnight or with short-run strategies. The Lao Government recognizes this and has put skills enhancement and capacity building at the very top priority of the national policy agenda. Actually, it's one of the major goals of its Seventh National Socio-Economic Development Plan.

Fig. 4.3.12 illustrates Knowledge Capital Productivity in Lao PDR, history and baseline scenario.

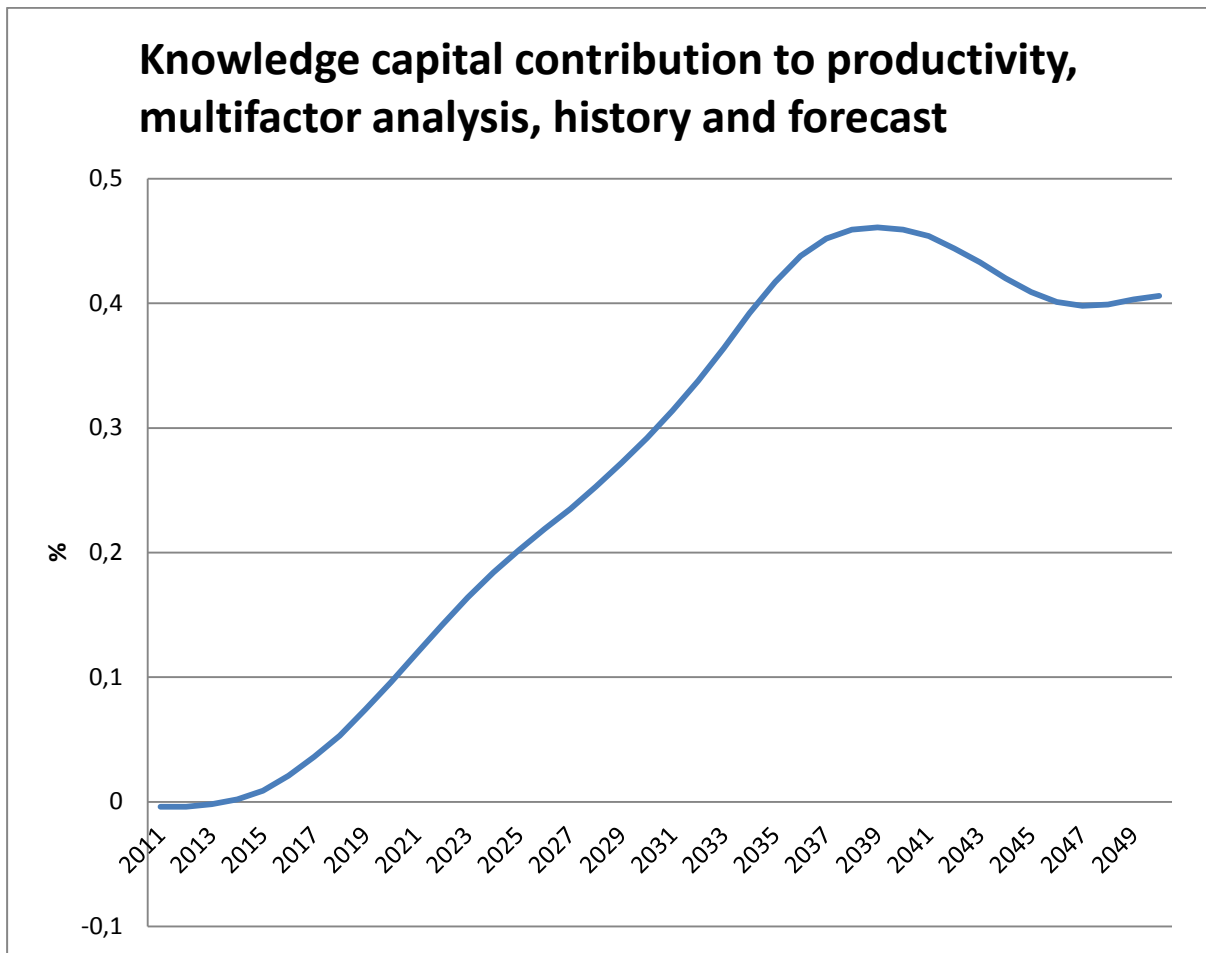


Figure 4.3.12. Knowledge capital productivity in Lao PDR, history and baseline scenario (IF Baseline Scenario, vers. 6.54).

Fig. 4.3.13 illustrates Physical Capital Productivity in Lao PDR, history and baseline scenario.

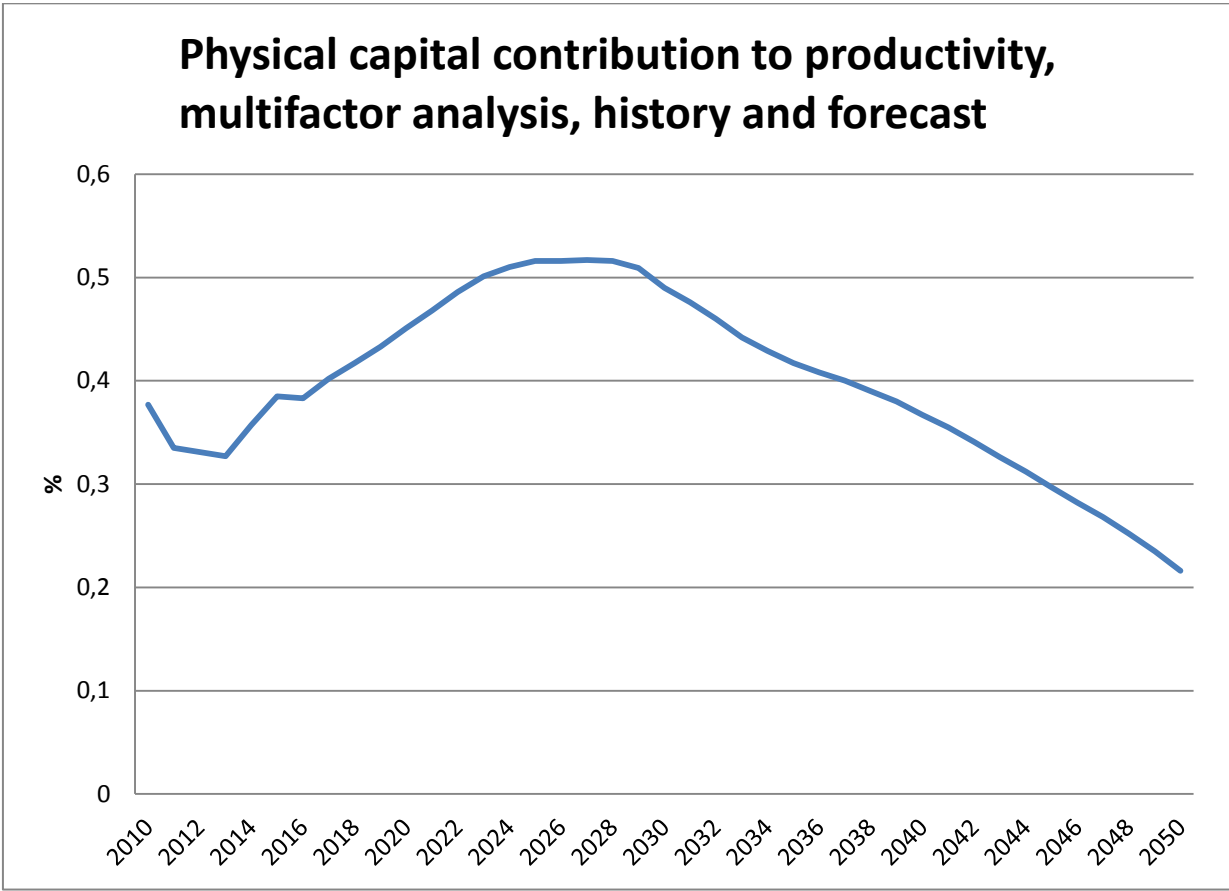


Figure 4.3.13. Physical capital productivity in Lao PDR (IF Baseline Scenario, vers. 6.54), years 2010-2050.

Fig. 4.3.14 illustrates Social Capital Productivity in Lao PDR, history and baseline scenario.

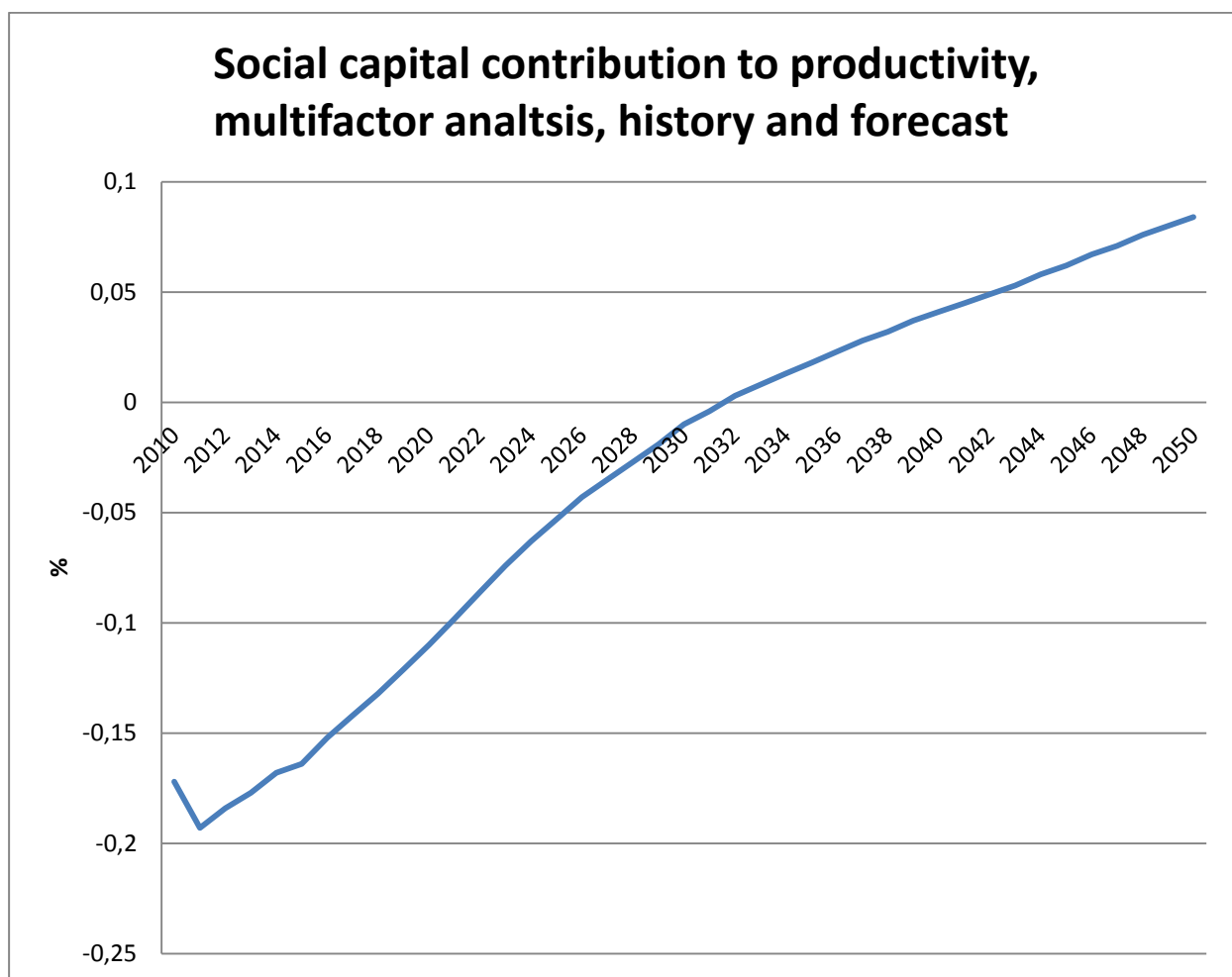


Figure 4.3.14. Social capital productivity in Lao PDR (IF Baseline Scenario, vers. 6.54), years 2010-2050.

By summarizing previous productivity analyses we can conclude that productivity development is expected to be progressive in the Lao PDR. Better education and new competences will be in key role in this development process. One key strategic challenge is to find positive synergy between foreign and public investments in Laos. When infrastructure and industrial investments are made, there must be enough trained workers to run production and maintain production capacity.

4.4. Baseline Scenarios of Urbanization

In Fig. 4.4.1, percentages of urban and rural population in the Lao PDR are presented. We can expect fast urbanization process to happen in Laos. Already in 2020, the percentage of urban population is going to be bigger than the size of rural population. In 2050, Laos is very urban nation if this baseline scenario will be realized.

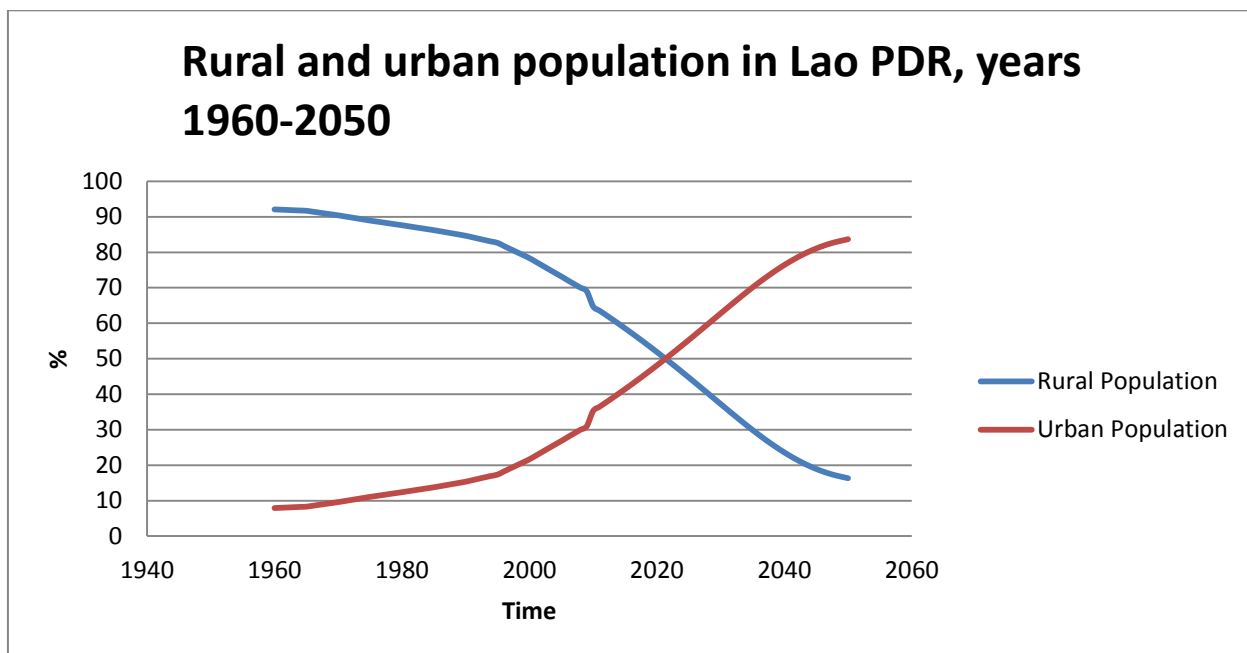


Figure 4.4.1. Rural and urban population in Lao PDR, years 1960-2050, history and baseline scenarios (IFs Baseline Scenario 2013), years 1960-2050.

In Fig. 4.4.2, the baseline scenario of urban millions in the Lao PDR is visualised. The amount of urban population will be much higher than it is today. Urbanization means growing needs of urban infrastructure in Laos. Housing conditions, health and education services and transportation services must be developed for growing urban population. This development also raises a high need for sustainable planning and managing the development of cities.

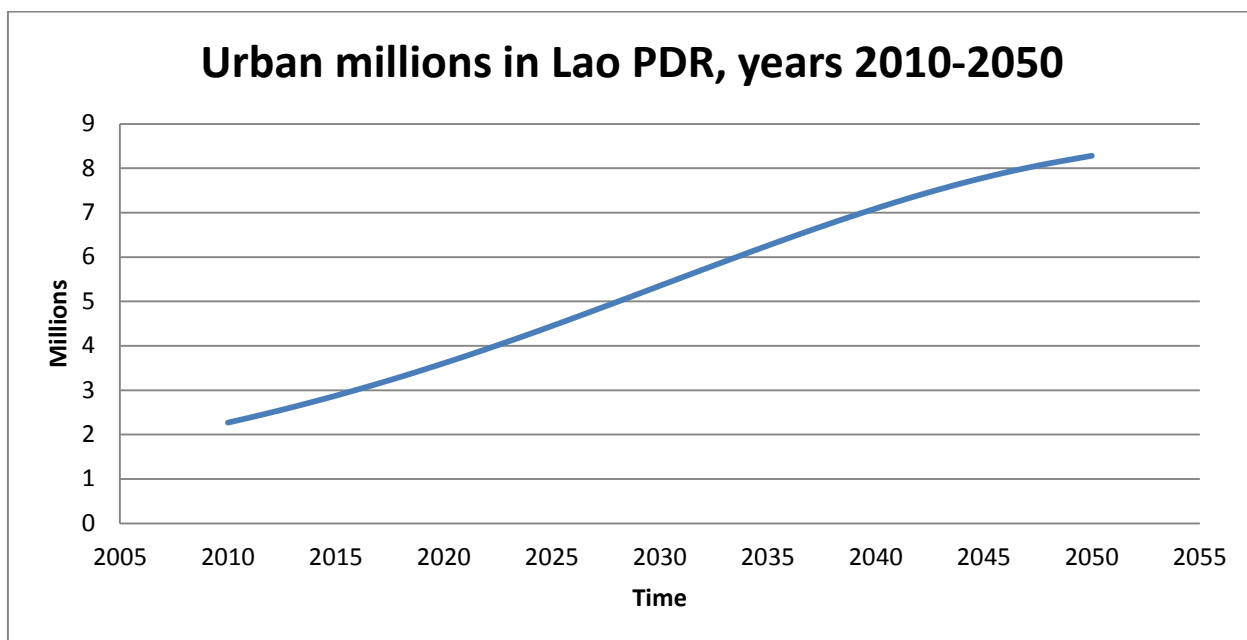


Figure 4.4.2. Urban millions in Lao PDR, years 2010-2050, history and baseline scenarios (IFs Baseline Scenario 2013).

Fig. 4.4.3 reports to us the baseline scenario of population density (population per hectare). The driving force behind this scenario is the demographic change in the Lao PDR.

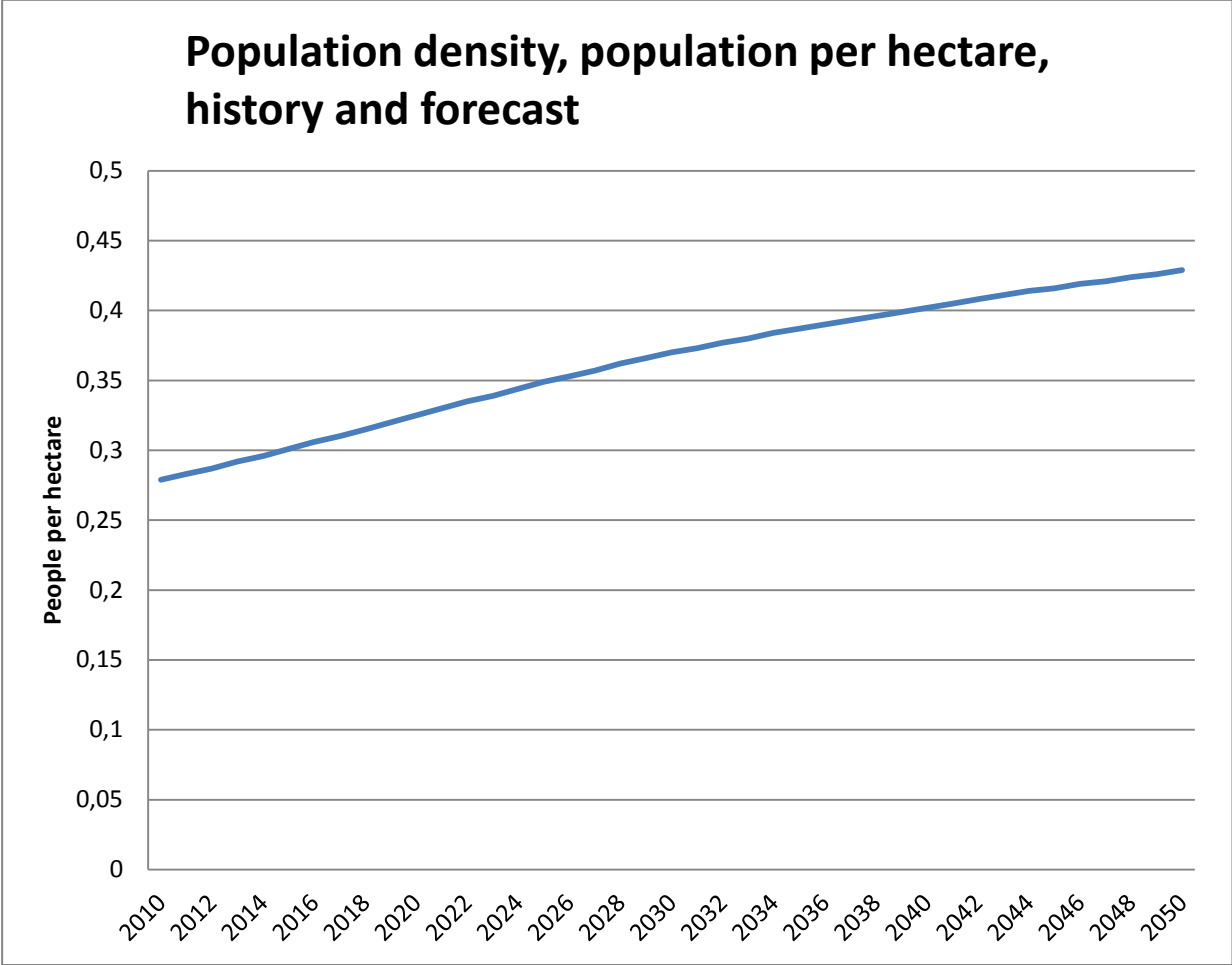


Figure 4.4.3. Population density, people per hectare in Lao PDR (IF Baseline Scenario, vers. 6.54), years 2010-2050.

4.5. Baseline Scenarios of Poverty and Welfare Development

In 2011, Lao PDR moved up from its lower income status to a lower-middle income economy, with a gross national income (GNI) per capita of US\$ 1,130 (UNDP, 2013, 12). The national poverty rate in Lao PDR has declined steadily, having dropped by 40 per cent over the period 1992/93 to 2007/08. However, the poor in geographically disadvantaged areas are poorer than the poor elsewhere and the severity of poverty has increased amongst the poorest. The poverty rate in rural areas is still almost twice that of the urban areas. The central region as a whole accounts for the largest absolute number of poor people, but the proportion of the population who are poor (poverty incidence) is much higher in the northernmost and southernmost provinces, which are more remote and have lower population densities. Inequality has increased in

practically all population groups, largely due to the consumption attributed to the richest quintile. (Menon & Warr, 2013, 11-12; UNDP, 2013, 18).

In Fig. 4.5.1 the two baseline scenarios of poverty (less than 1,25 \$ or 2 \$, cross-sectional formulation) are visualised in the Lao PDR. Probably poverty problem will be smaller in the Lao PDR in the long-run before 2050. The process toward less poor nation will not be linear, when we observe the baseline scenarios of poverty reduction.

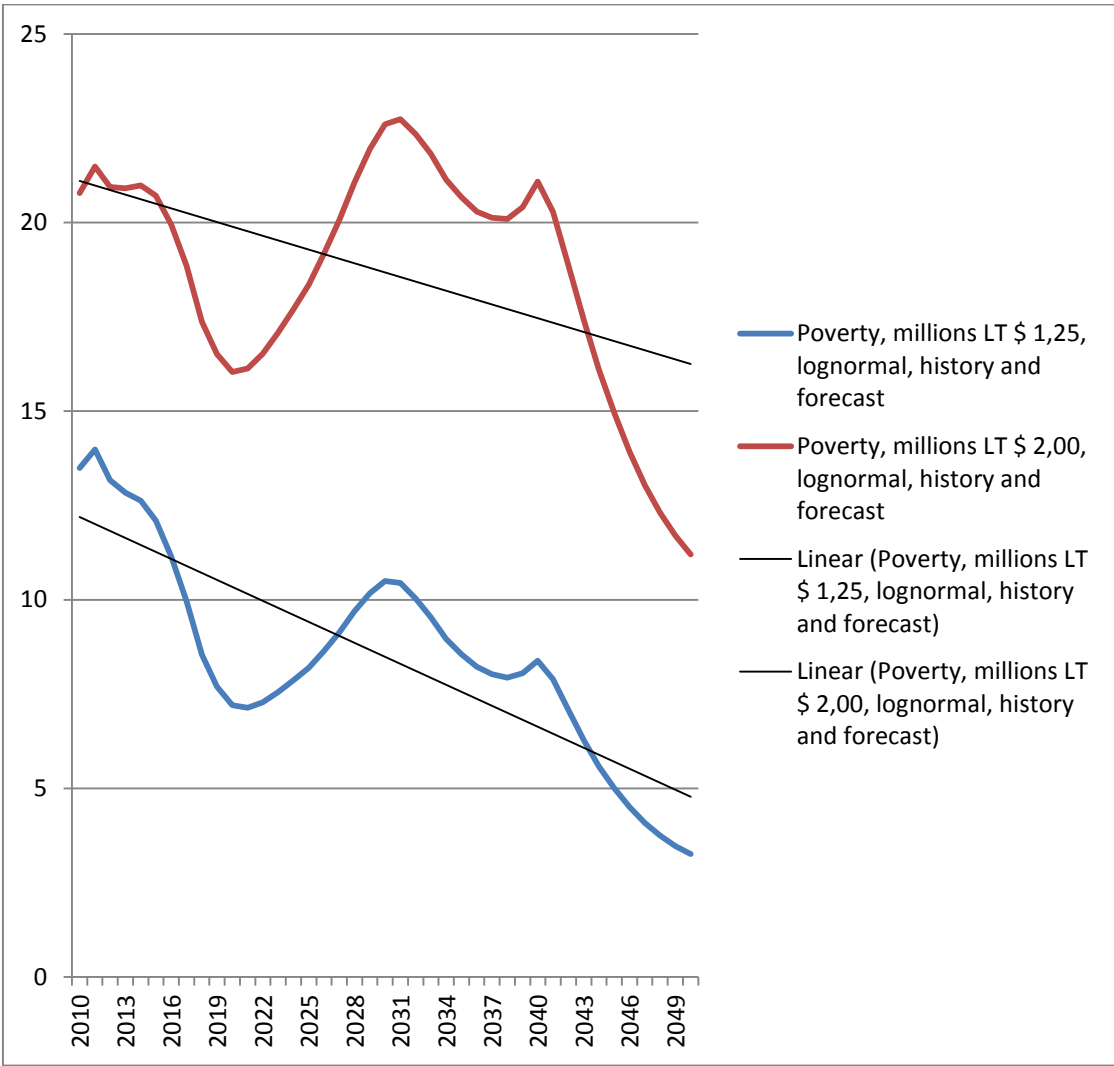


Figure 4.5.1. Poverty less than 1,25 \$ or 2,00 \$ (cross-sectional formulation) in Lao PDR, years 2010-2050, history and baseline scenario (IFs Baseline Scenario, 2013), years 2010-2050.

MDGs Progress in Lao PDR

The Seventh National Socio-Economic Development Plan of Lao PDR (NSEDP) for 2011–15 is planned to outline efforts to achieve Millennium Development Goals and it provides the Government of Lao PDR a framework for both economic and social advancement. The targets of the NSEDP for 2010-2015 are to: (i) ensure continuation of national economic growth with security, peace and stability, and ensure GDP growth rate of at least 8% annually and GDP per capita to be at least USD 1,700; (ii) achieve the Millenni-

um Development Goals by 2015, and adopt appropriate technology, skills and create favourable conditions for graduating the country from LDC by 2020; (iii) ensure the sustainability of development by emphasizing economic development with, cultural and social progress, preserving natural resources and protecting the environment; and (iv) ensure political stability, peace, solidarity and an orderly society (The GOL, 2010). The National Growth and Poverty Eradication Strategy (NGPES) has targeted poverty reduction interventions to 72 priority districts (47 first priority and 25 second priority districts), chosen using a set of basic needs indicators at the local level. All of these 72 priority districts are overwhelmingly rural (Menon & Warr, 2013, 12).w

The country is on course to achieve the MDG target of halving poverty by 2015. However, the progress on achieving the other millennium development goals (MDGs) has been mixed. According to UNESCO (2012) and MAF & UNDP (2010), between 1991 and 2005, net primary school enrolment rose from 58 to 84 per cent. Child mortality indicators are also improving steadily: under-five mortality shows a decrease from 170 to 98 per 1,000 live births; and infant mortality has fallen from 104 to 70, which indicate a strong potential for Lao PDR to achieve its MDG targets by 2015. However, Lao PDR is seriously off-track to achieve three MDG targets, which are “reduce hunger by half, “universal access to reproductive health” and “reverse the loss of environmental resources”. Other of the off-track MDGs targets are “universal primary schooling” and “eliminate gender disparity at all levels of education”, “reduce maternal mortality by three quarters”, “halve the number of people without safe drinking water in rural areas”, and “halve the number of people without sanitation in rural areas”. (MAF & UNDP 2010; UNESCO 2012 in Jusi, 2013, 86).

Table 4.5.1. MDGs progress in Lao PDR (MAF & UNDP, 2010).

MDGs	Target	Seriously off track	Off track	On track	No target
Goal 1: Poverty and hunger	Reduce extreme poverty by half			●	
	Reduce hunger by half	●			
	Achieve full and productive employment and decent work for all				●
Goal 2: Universal primary education	Universal primary schooling		●		
Goal 3: Gender equality and women's empowerment	Eliminate gender disparity at all levels of education		●		
Goal 4: Child mortality	Reduce child mortality under five years of age by two thirds			●	
Goal 5: Maternal health	Reduce maternal mortality by three quarters		●		
	Universal access to reproductive health	●			
Goal 6: HIV/AIDS, malaria, and other diseases	Halt and reverse the spread of HIV/AIDS			●	
	Achieve universal access to HIV/AIDS treatment			●	
	Halt and reverse the spread of malaria			●	
	Halt and reverse the spread of TB			●	
Goal 7: Environmental sustainability	Reverse the loss of environmental resources	●			
	Reduce rate of biodiversity loss				●
	Halve the number of people without safe drinking water in rural areas		●		
	Halve the number of people without safe drinking water in urban areas			●	
	Halve the number of people without sanitation in rural areas		●		
	Halve the number of people without sanitation in urban areas			●	

In Fig. 4.5.2 we have reported statistics of infant mortality, history and baseline scenario till 2050. The expected development of infant mortality is positive, leading to lower infant mortality. This scenario path, of course, is a robust estimation of possible developments in this field.

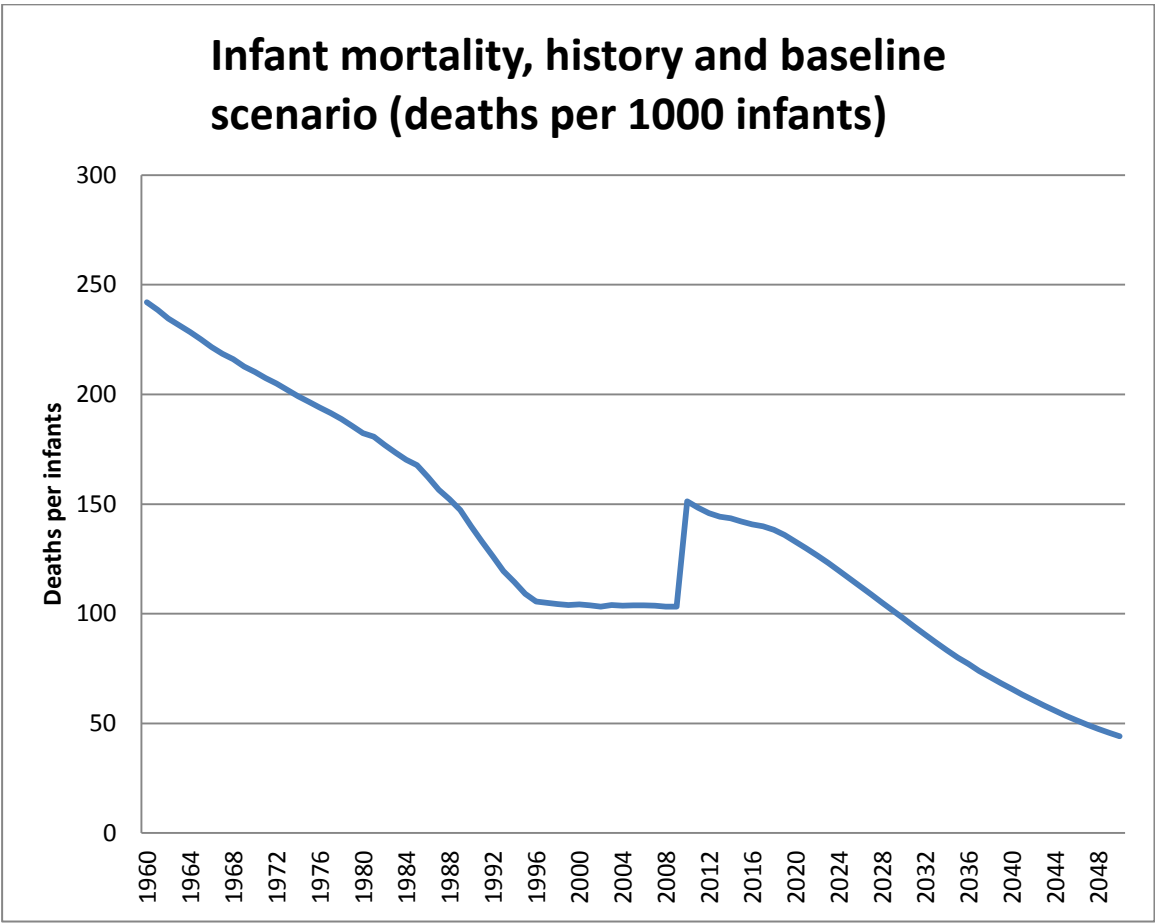


Figure 4.5.2. Infant mortality in Lao PDR (IF Baseline Scenario, vers. 6.54), years 2010-2050

In Fig. 4.5.3, we have reported statistics of rural roads access, history and baseline scenario till 2050. The expected development of rural roads access is positive, leading to less people without rural road access. This scenario path again, of course, is a robust estimation of possible developments in the field of rural road access. Developing rural road access is an important issue from the point of poverty reduction. Developing rural road access will increase economic connectivity and access to resources and markets increasing labour and trade mobility in the rural areas of Lao PDR leading to more income as well as employment opportunities for local communities in the road catchment areas. Also, improving road access will facilitate to improving access to key social services and infrastructure such as schools and health services.

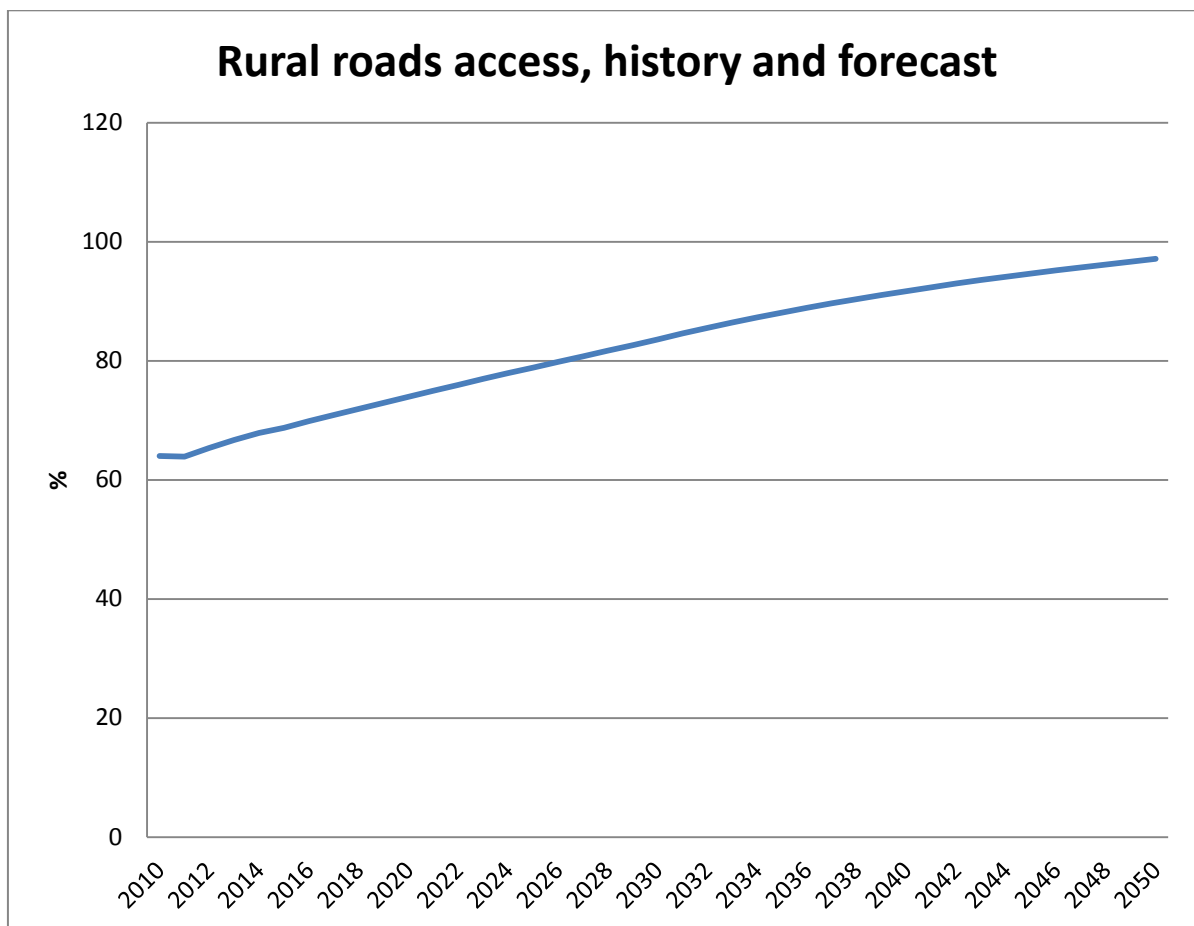


Figure 4.5.3. Rural road access, history and baseline scenario (IF Baseline Scenario, vers. 6.54), years 2010-2050

In Fig. 4.5.4, we have reported statistics of Water Index, history and baseline scenario till 2050. The expected development of water sector is positive, leading to better water services. This scenario path again, of course, is a robust estimation of possible developments in the water sector. In 2018 Water Index is reaching positive level according to this index.

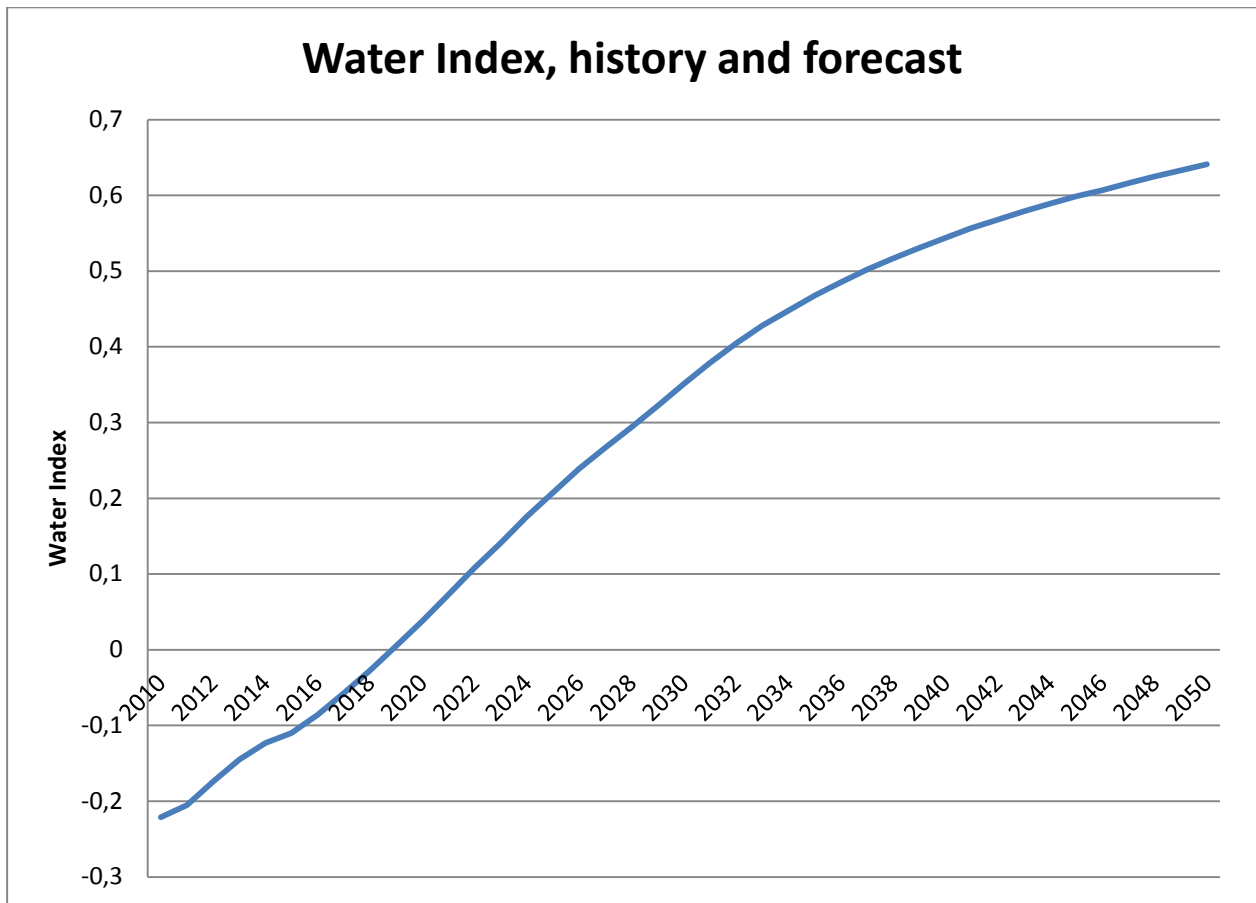


Figure 4.5.4. Water Index⁴, history and baseline scenario (IF Baseline Scenario, vers. 6.54), years 2010-2050.

In Fig. 4.5.5, we have reported statistics of education level developments, history and baseline scenario till 2050. The economy of Lao PDR, is modernizing rapidly and this has important implications for the work skills and novel competences that are needed in the future. To find and keep a job, more and more Lao workers will need a broader set of skills and capabilities, which go beyond the basic skills, ability to read and write. In the future, workers will be asked to quickly learn how to operate new tools and machinery, work in larger work teams, and solve more complicated problems. Also self-management skills will be needed when the demand of knowledge workers increase.

⁴ Definition of Water Index – Water Index is defined as $WI = (\text{Water Index} + \text{Sanity Index})/2$.

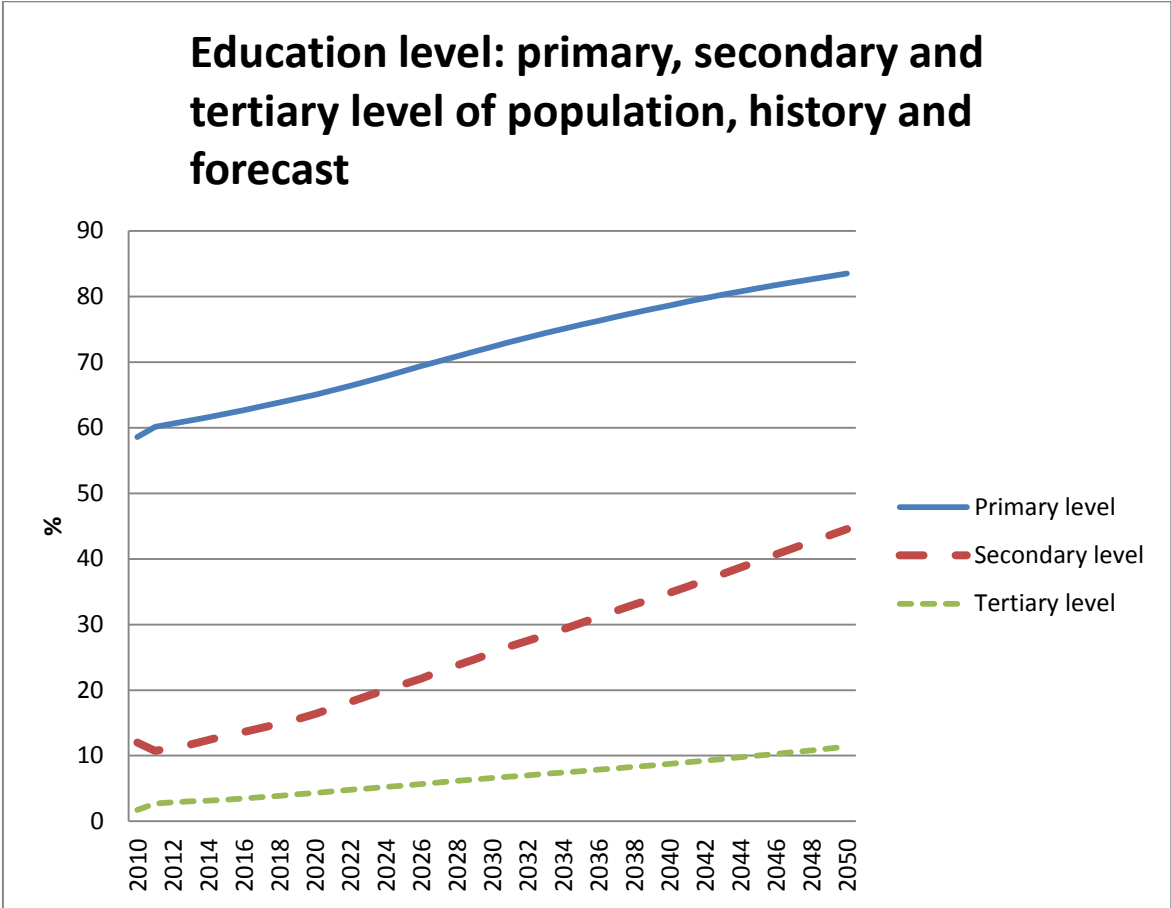


Figure 4.5.5. Education, (IF Baseline Scenario, vers. 6.54), years 2010-2050.

The expected development of education level in primary, secondary and tertiary levels is very positive and promising, leading to Lao people to better and comprehensive education. This educational scenario path again, of course, is a robust estimation of possible developments in this field.

In Fig. 4.5.6 we have visualised terrestrial protected area (& of total land area) in Laos.

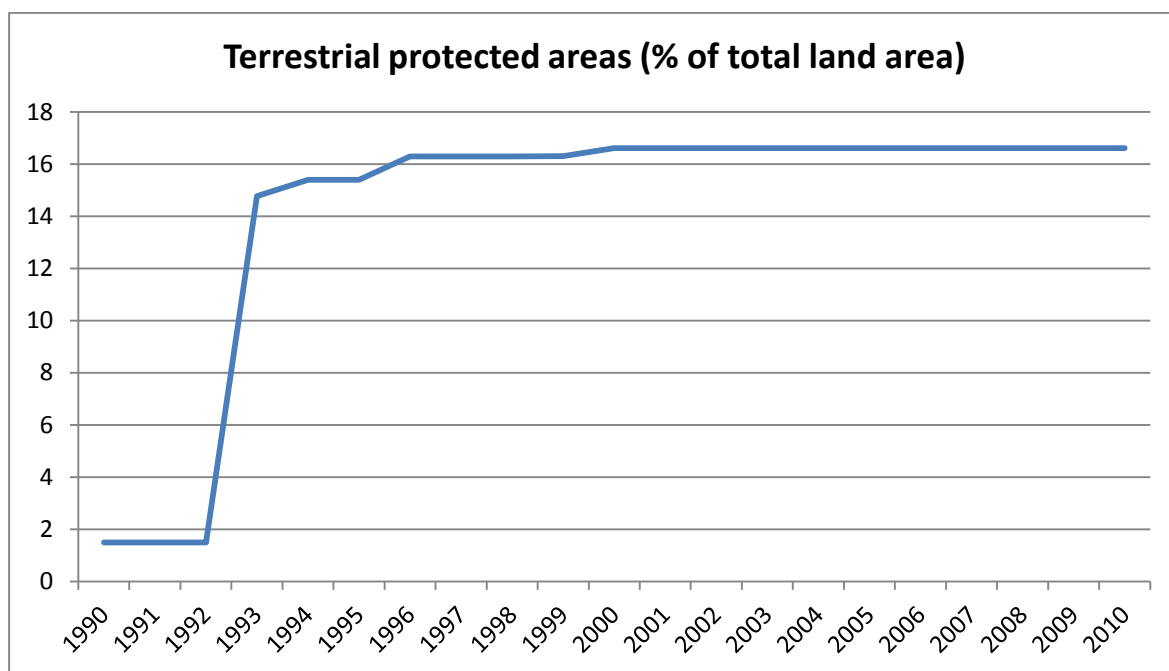


Figure 4.5.6. Terrestrial protected areas (% of total land area) in Laos, 1990-2011 (World Bank, 2013).

In Fig. 4.5.7 we have figured out annual freshwater withdrawal in Laos in 2007 and 2011. Agriculture is biggest withdrawer of freshwater in Laos. Other sector are using much less amount of water.

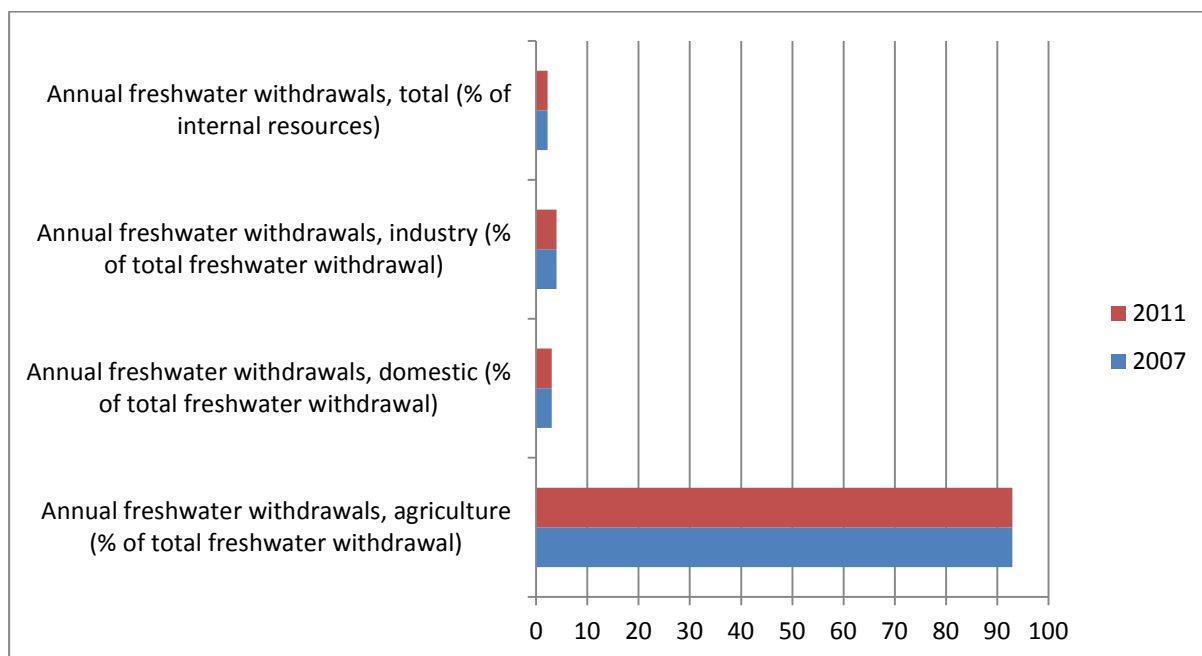


Figure 4.5.7. Annual freshwater withdrawals in 2007 and 2011 (% of internal resources) (World Bank, 2013).

In Fig. 4.5.8 we have reported GEF⁵ benefits from biodiversity in Laos.

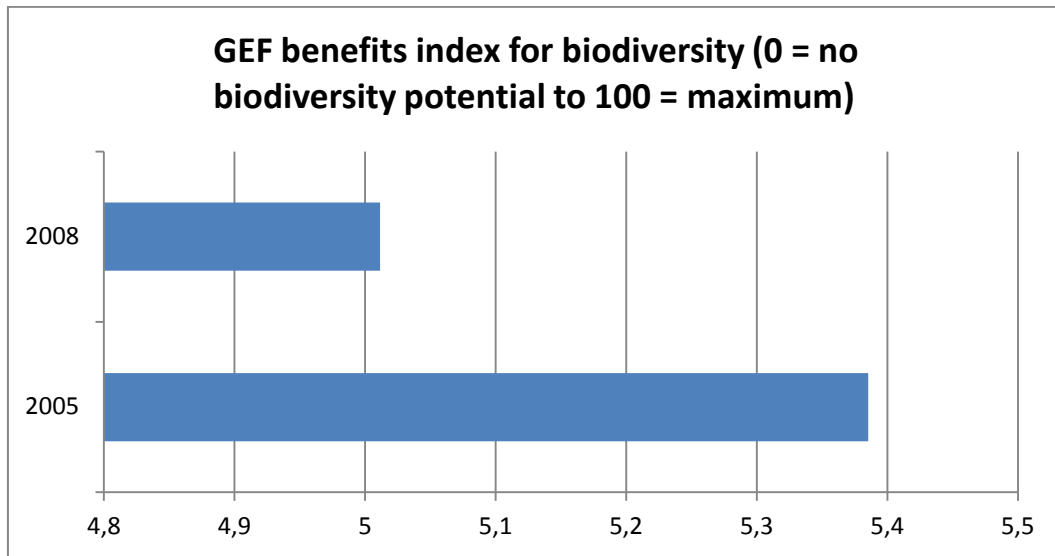


Figure 4.5.8. GEF benefits index for biodiversity in Laos in 2005 and 2008 (World Bank, 2013).

Agriculture is still very important sector of livelihood in Laos. In Fig. 4.5.9 we have visualised the trends of land use in agriculture and forestry.

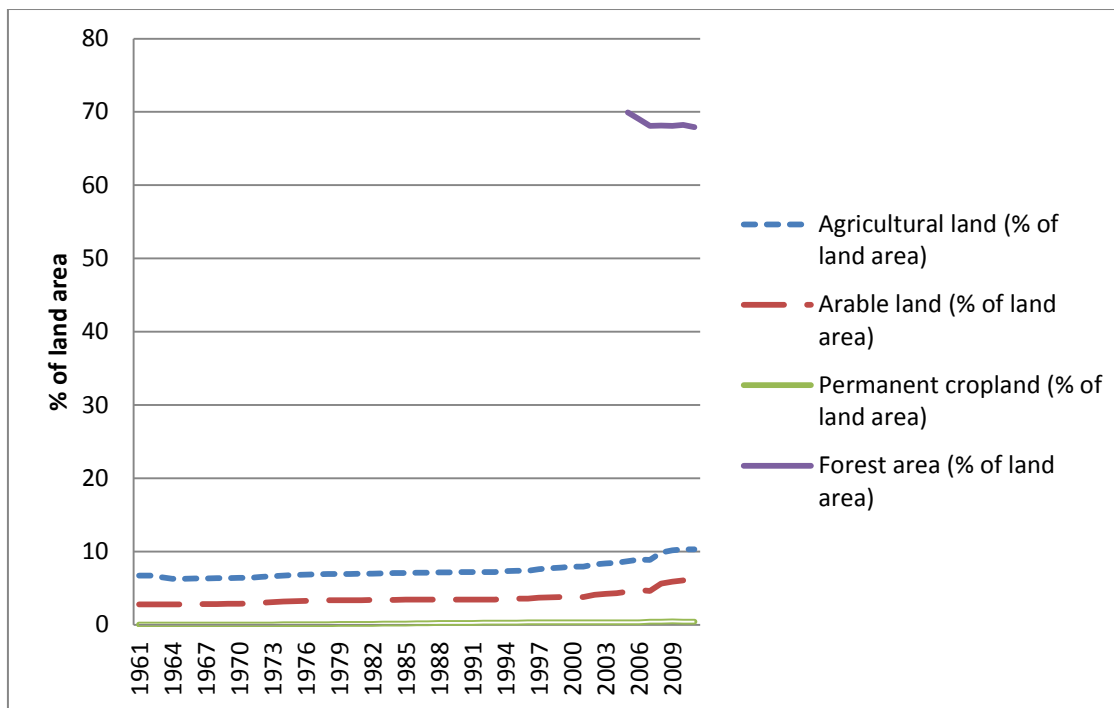


Figure 4.5.9. Agricultural land, arable land, permanent cropland and forest area in Laos (% of land area) (World Bank, 2013).

⁵ GEF benefits index for biodiversity is a composite index of relative biodiversity potential for each country based on the species represented in each country, their threat status, and the diversity of habitat types in each country. The index has been normalized so that values run from 0 (no biodiversity potential) to 100 (maximum biodiversity potential) (World Bank 2013).

Fig. 4.5.9 informs us that there have not been drastic changes in agricultural land use in Laos. However, forest area in Laos is decreasing.

In the next section, we shall report our analysis of energy sector in more detail.

In Fig. 4.5.10 we report key trends of agricultural production in Laos. Trends are presented with production indexes, crop production index, food production index and livestock index.

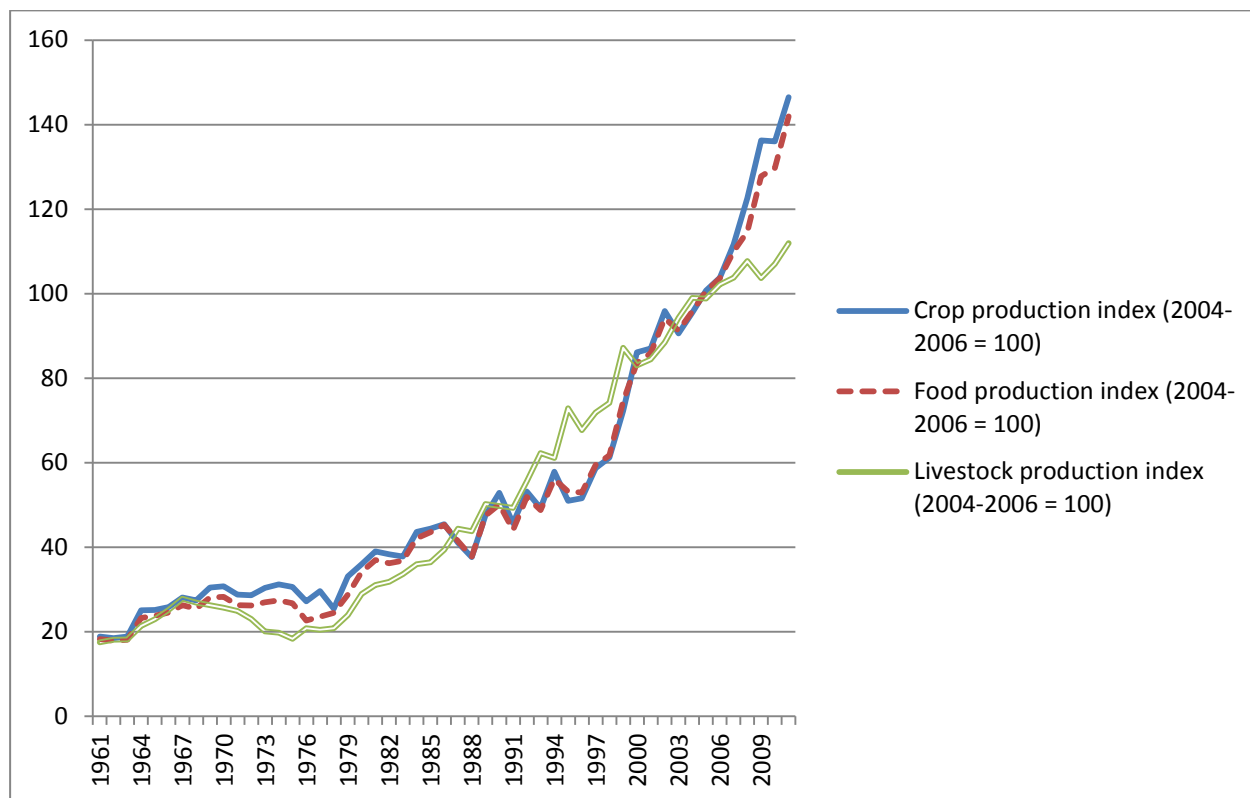


Figure 4.5.10. Crop production index, food production index and livestock index in Laos, 1961-2011 (World Bank 2013).

These index series show that agricultural policy has been quite successful in Laos. Crop and food production are now 7-fold bigger than in 1960. In Laos, livestock production is over 5-fold bigger than in 1960. Probably food security has improved in Laos.

4.6. Energy Sector Trends and Scenarios Analyses in the Lao PDR

This section 4.6 is mostly based on previous energy scenario study (Luukkanen, Kouphokham et al. 2012). In this integrative report we emphasize that these forecasting scenarios are linked to Adaptive Foresight methodology of the FREPLA 2020 project.

4.6.1. Introduction to energy demand analysis

The energy sector of Laos is having challenging perspectives. This section elaborates future perspectives of energy sector in Laos by four alternative scenario analyses. These four scenario analyses are: (1) BaU Laos scenario, (2) Mobile Laos Scenario, (3) Industrial Laos Scenario and (4) Agroservice Laos Scenario. All these energy demand scenarios are based on alternative assumptions of the Laotian economy. These assumptions are reported in this study. Our study demonstrates the need of investigate energy policy options which go beyond baseline scenario analysis. In ASEAN region Laos is planned to be “the battery of the Mekong area”. From this perspective scenarios provide interesting perspective. Major uncertainties of energy planning in Laos are linked to economic growth rate and dynamics, to the structure of economy and to energy mix of the economy. Also fastness of urbanization is a major uncertainty of energy planning. All these energy planning issues include risks, which need to be understood.

Climate change, energy production and energy consumption are issues that have received much attention in the past decade. In many developing countries, scientific research on energy technologies and infrastructure is more focused on single technologies or on implementation of energy sector projects, not on broader long-run questions of energy consumption and production. Less commonly research explores public strategy to energy policy, energy production systems or energy policy scenarios, in which the interactions and trade-offs among energy policy options are more apparent. Yet, arguably, public responses to energy policy options cannot be fully understood without taking into account the wider planning context in which policy and strategic choices need to be made.

Scenario analysis is a suitable methodological tool for this kind of energy policy and energy planning purposes. It allows scenario learning of decision-makers and strategic discussions about future developments (see Mercer, 1998; Reymonds and Vince, 2004; Schoemaker, 2004, 1995, 1993, 1992; Schoemaker and van der Heijden, 1993; Upham, Carney and Klapper, 2014; Wack, 1985). Energy scenario analyses are today widely used in energy planning processes and in strategic analyses of energy policy (see e.g. Mustonen, 2010; Small and van Dender, 2007; Spiecker and Weber, 2014). This study, focusing on energy sector and energy demand scenarios, follows this well-established research tradition. Scenarios are normally used to understand uncertainties and risks.

Energy scenarios for Laos were constructed with LINDA model. LINDA (Long-range Integrated Development Analysis) model is an integrated model for the analysis of energy economic system. As an integrated model it identifies three categories of mitigation measures related to energy systems: decarbonization of the energy supply sector, reductions in final energy demand as a function of socio-economic and techno-

logical changes and switching to low-carbon fuels, including electricity, in the energy end use sectors. LINDA model belongs to the Accounting Framework category of energy models.

The LINDA model is based on intensity approach utilizing the Extended Kaya Identity (Luukkanen, 2010). The LINDA model uses following Extended Kaya Identity for the calculation of CO₂ emissions.

$$CO_2 = \frac{CO_2}{TPES} \times \frac{TPES}{FEC} \times \frac{FEC}{GDP} \times \frac{GDP}{POP} \times POP(1)$$

where CO₂ is the total CO₂ emissions, TPES is the total primary energy supply, FEC is the final energy consumption, GDP is the Gross Domestic Product and POP is the population. This Kaya identity forms the basic framework for the LINDA model, but the model is much more detailed including different fuels and electricity, electricity production as well as different sectors of economy in the calculation procedures.

In addition, LEAP model was used to construct scenarios for household energy use in Laos. In the LEAP model the population, consisting of households, was divided into sub-groups depending on whether they live in urban or rural areas and whether they have access to electricity grid and to which income category they belong. These factors have a determining impact on the energy use profile of the households and, therefore; their inclusion in the analysis is essential (Luukkanen et al., 2014).

The LINDA model, based on the given input, calculates future scenarios for the economy and the energy use in different sectors. Figure 4.6.1 gives a simplified illustration of the main calculation blocks of the model for energy demand construction in the different production sectors. This type of calculation is carried out for the different fuels and electricity in each modeled economic sector (agriculture, industry, transport, commercial, construction, others). Figure 4.6.2 indicates the linkages of different calculation modules in the LINDA model.

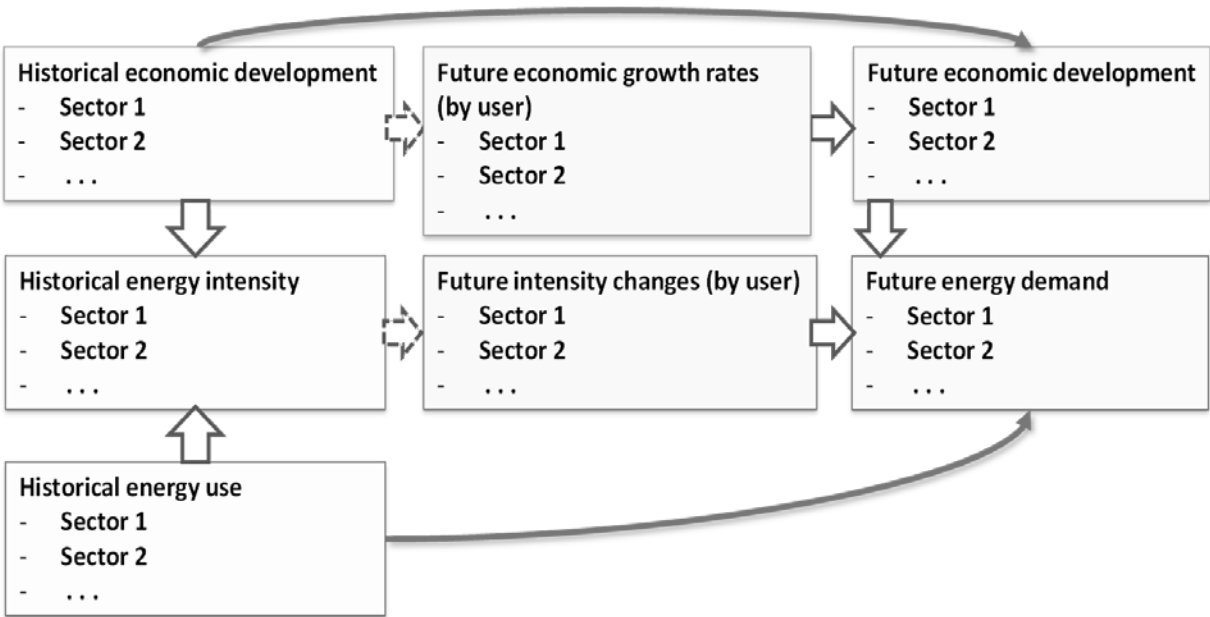


Figure 4.6.1. Calculation procedures of the LINDA model.

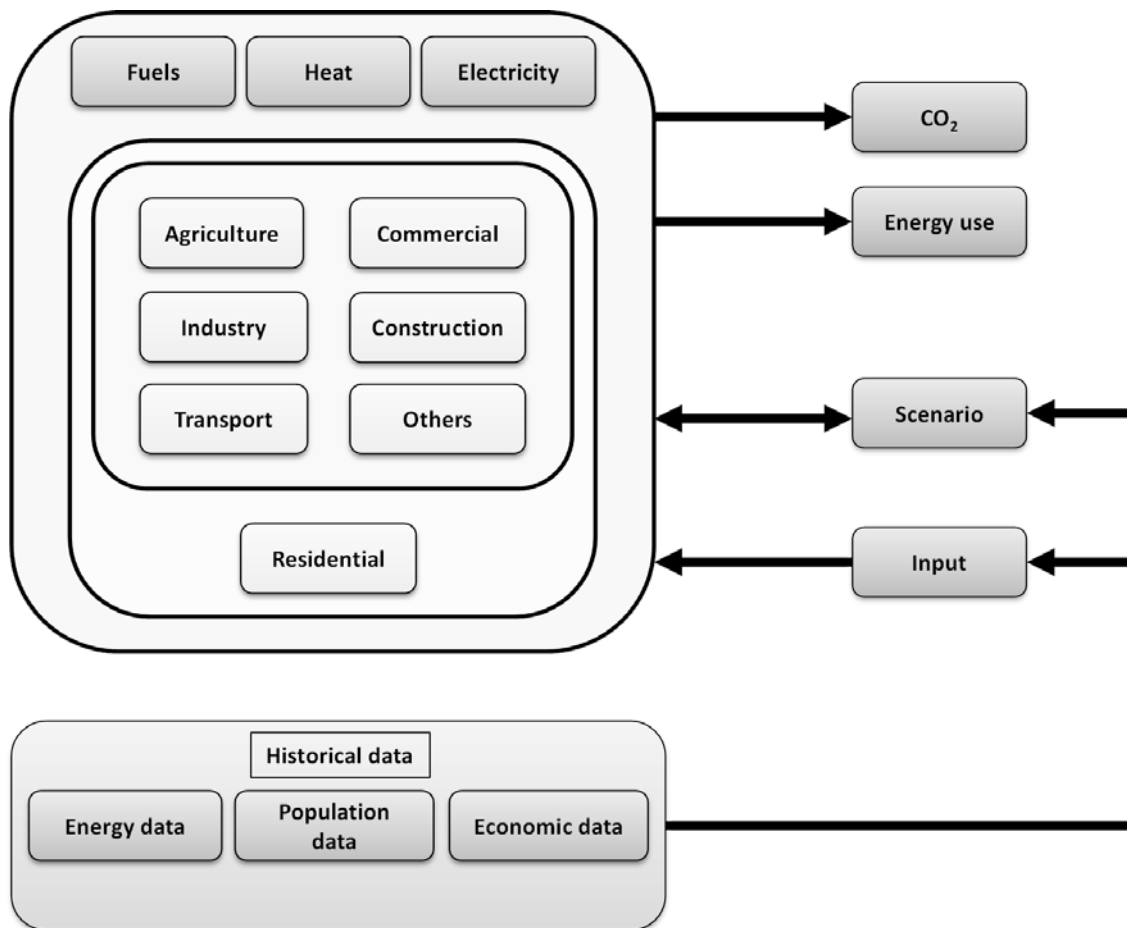


Figure 4.6.2. Linkages of different calculation modules in the LINDA model.

4.6.2. Historical background for energy planning and policy in Laos

Energy use in Laos has been growing considerably in recent years (see. Fig. 4.6.3). In particular, growth in transport energy use and industrial energy use has been rapid. Residential energy use is still, however, dominant in Laos. The energy use data is from Mr. Khamso Kouphokham, the Department of Electricity, Ministry of Energy and Mines, Lao PDR.

Lao PDR's electricity generating capacity doubled when the Nam Theun 2 hydropower project (1,080 MW) commenced operation in March 2010. It is projected to rise further as other hydropower projects, currently under construction, are completed and start commercial operations. (IMF, 2011).

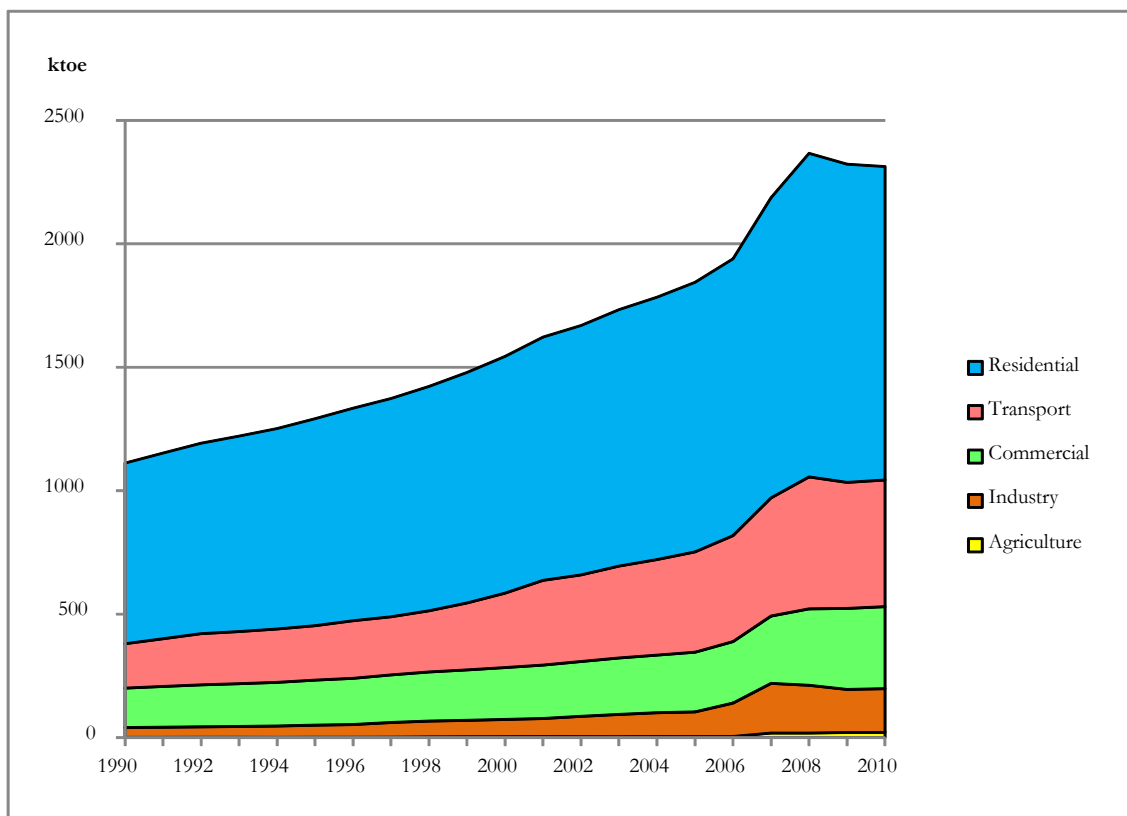


Figure 4.6.3. Energy use in different sectors in the Lao PDR.

Fuel wood is the main energy source in Laos. It is used mainly for cooking, but industrial use of fuel wood is also considerable. Charcoal is another important fuel for cooking, especially in urban areas. The fuels used in the transport sector – diesel, gasoline, and jet fuel – cover over 20% of the total consumption.

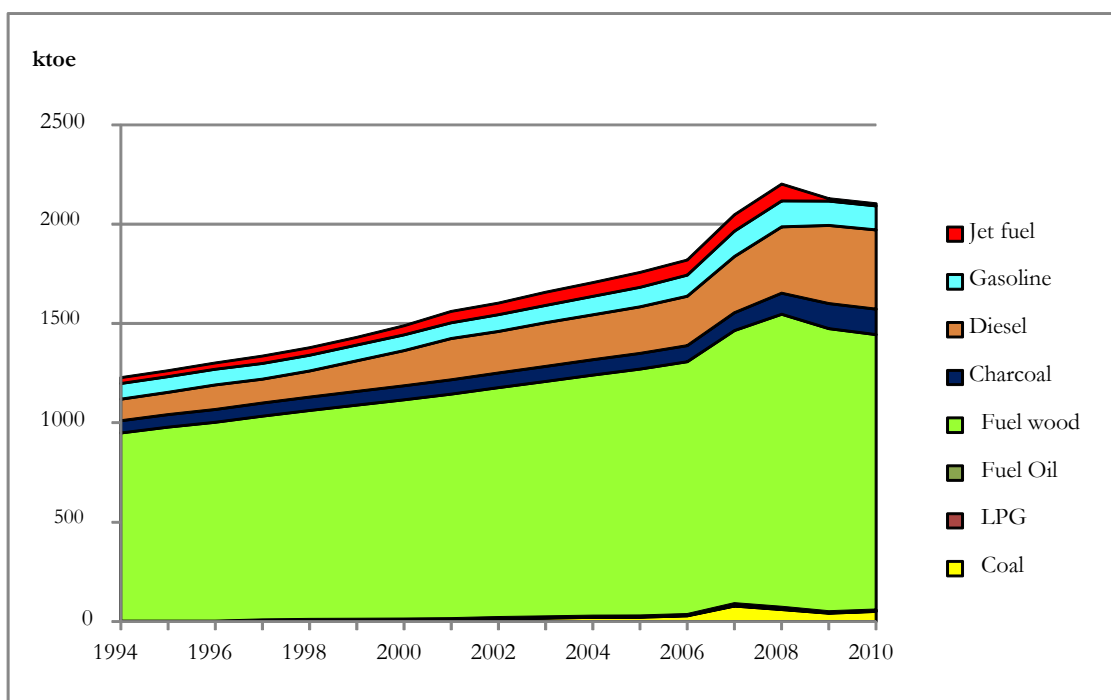


Figure 4.6.4. Fuel use in Laos.

Industry and energy use

In the industrial sector energy consumption has grown very rapidly, although its share in total energy consumption is still small (see Fig. 4.6.5). Especially coal use for industrial purposes has increased considerably. Electricity consumption in industry has grown fast. In the future the main question concerning industrial energy use is the establishment of metal industry in Laos. There are a lot of mineral deposits available and if their processing starts, energy consumption will grow considerably. Especially if aluminium production begins in Laos, the increase in energy consumption will be high.

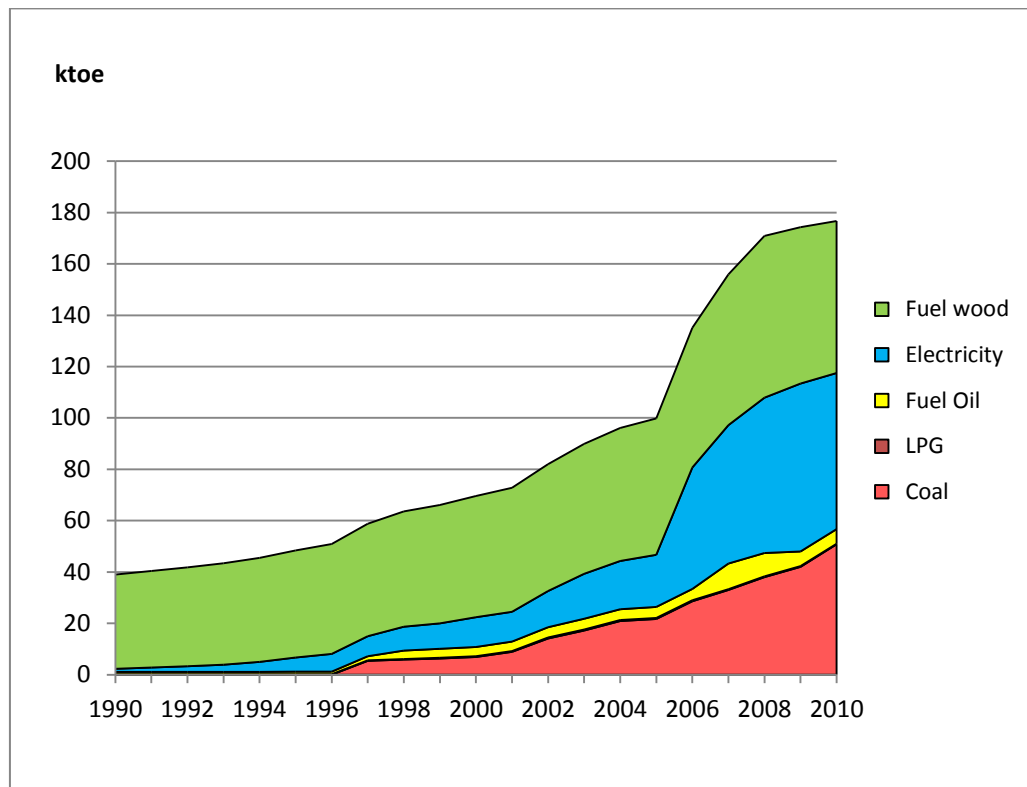


Figure 4.6.5. Industrial energy use in Lao PDR.

Transport energy use

Transport sector has increased its share in energy use rapidly due to the increase of cars, motorbikes, and mobility of people. Freight transport has also increased considerably. Especially the use of diesel oil in transport sector has increased rapidly. Continuous growth in road transport requires investments in infrastructure (roads). Increasing demand in diesel and gasoline and oil price increase will rapidly increase the cost of imported fuels. This will have an effect on trade balance. This is one reason why the potential for biofuels in transport sector has gained increasing interest.

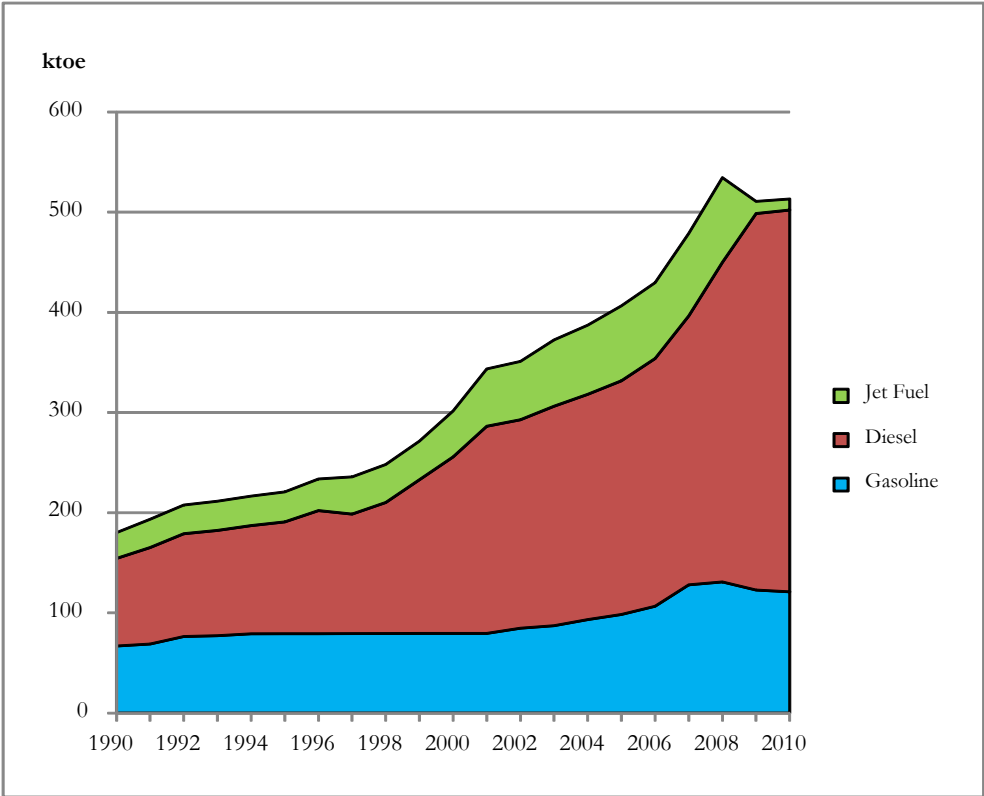


Figure 4.6.6. Transport energy use in Lao PDR.

Commercial sector energy use

Energy use in the commercial sector has steadily grown. Increasing tourism will have an effect on the energy use. Especially electricity use will be growing fast. Fuel wood and charcoal still dominate the energy use in the commercial sector. This indicates the importance of cooking in the sector. The structural change in economy in the long term will increase service sector energy use with the increased share of the commercial sector in producing value added at the national level.

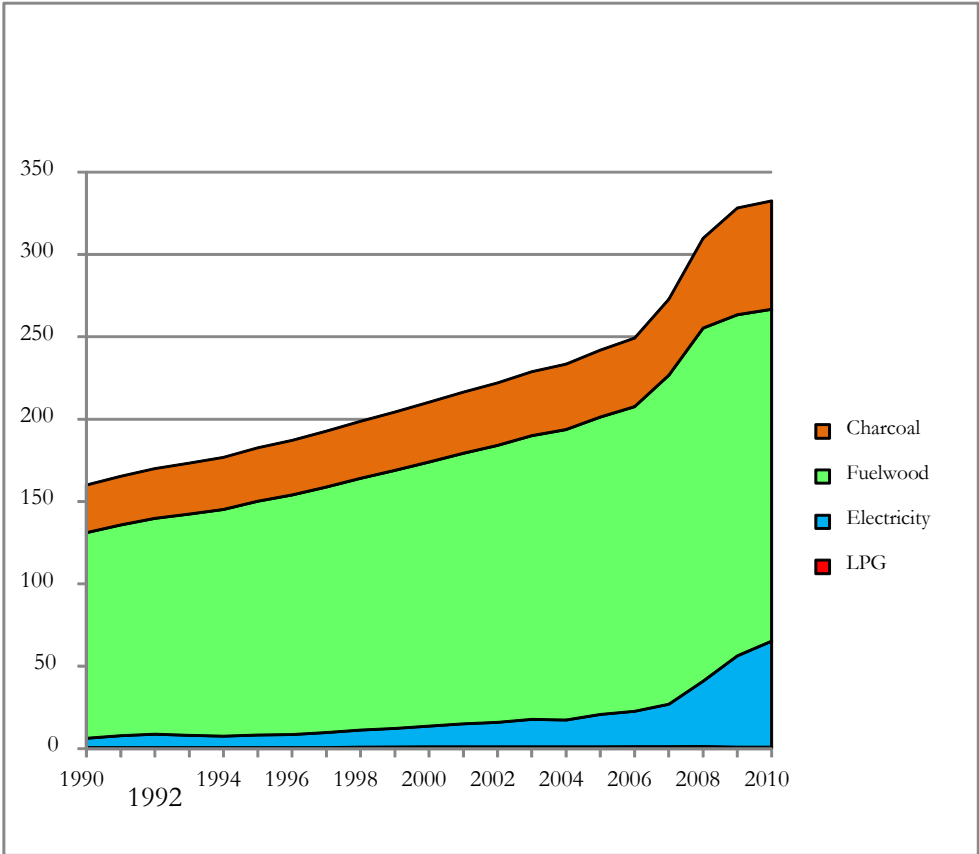


Figure 4.6.7. Energy use in the commercial sector in Lao PDR.

Agricultural energy use

In the agricultural sector electricity use has increased especially in the late 1990's. This is due to the increased pumping for irrigation and the processing of agricultural products such as rice milling. Increased mechanisation of agriculture will increase energy use, especially diesel consumption. Agricultural residues have a large renewable energy potential, but their use is still very limited. There is a large potential for biogas and biofuel production, but the introduction of these technologies requires considerable investments, which are not always available. In the statistics there is a huge increase in diesel use for agriculture in 2007. This is due to the change in statistical practices.

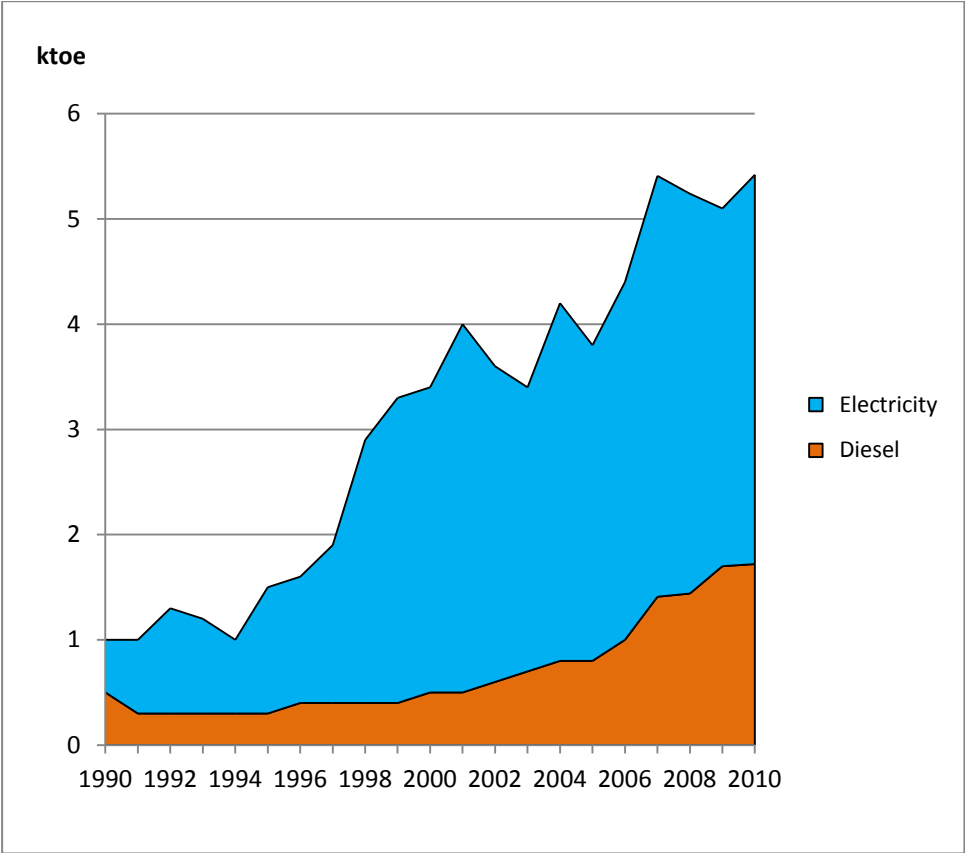


Figure 4.6.8. Agricultural energy use in Lao PDR.

Household energy use

Households still constitute the main energy consuming sector in Laos. Household energy use is dominated by fuel wood for cooking. Electricity consumption, which is still very low, will increase with electrification rate and new appliances. The fast population growth and increased urbanisation will increase LPG, charcoal, and the potential of forests to supply enough wood for household energy and industry in the future.

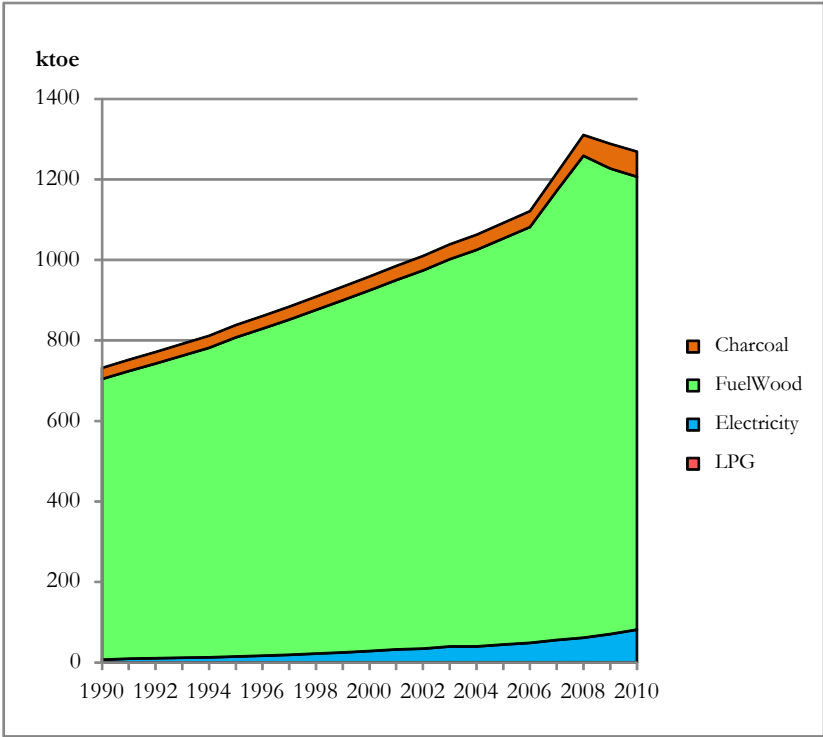


Figure 4.6.9. Residential energy use in Lao PDR.

Development of CO₂ emissions in Laos

In Fig. 4.6.10, we have figured out CO₂ emission statistics in Laos. We can observe that in 1995 CO₂ emissions started to increase. CO₂ emissions are still on a low level compared to the development of other ASEAN countries.

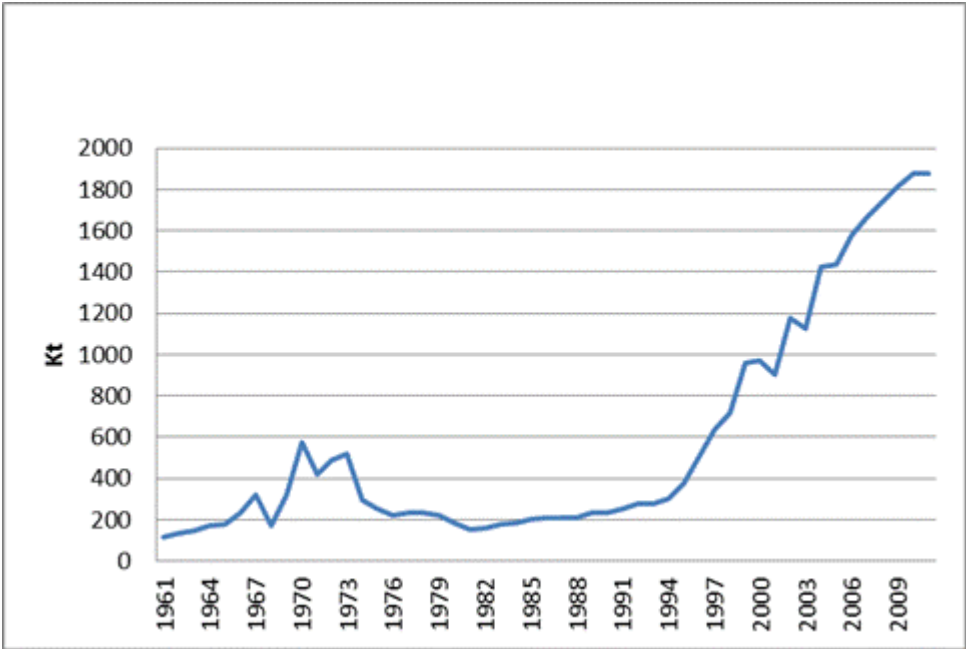


Figure 4.6.10. CO₂ emissions (kt) in Laos (World Bank Country Database, 2013).

In Fig. 4.6.11, statistics of CO₂ emissions per capita (metric tons per capita) in Laos are illustrated. This figure follows the same logic as Fig. 4.6.10 CO₂ emissions per capita were quite high in early 1970s. After 1995 CO₂ emissions started to increase again. The increase of CO₂ emissions is 6-fold compared to the level of 1995.

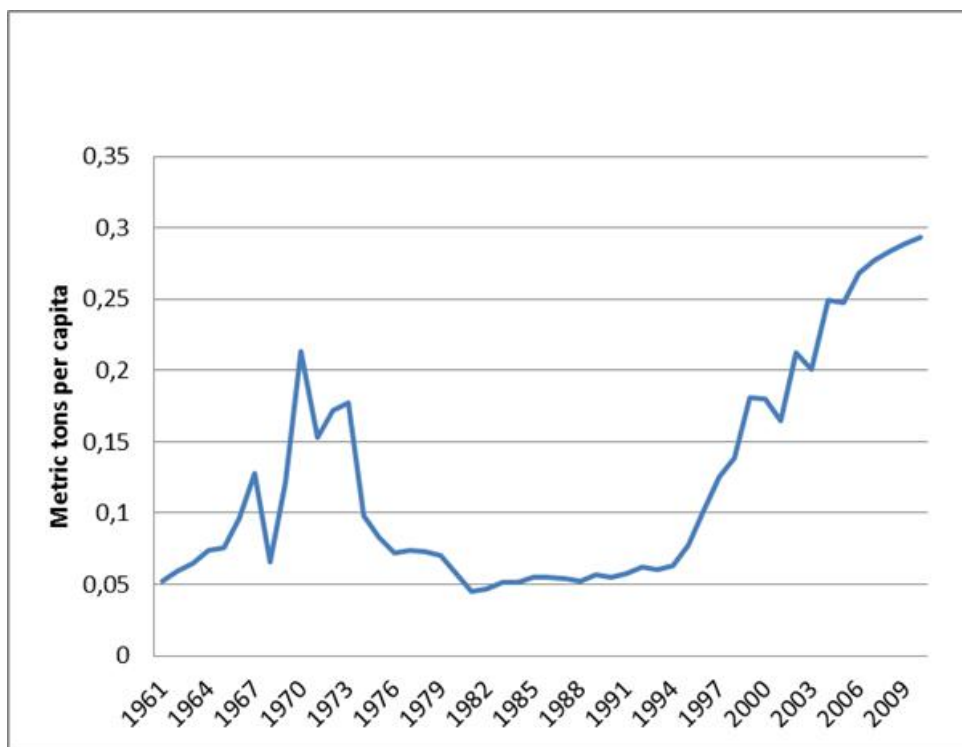


Figure 4.6.11. CO₂ emissions (metric tons per capita) in Lao PDR (World Bank Country Database, 2013).

Fig. 4.6.12 reports historical developments of CO₂ emissions from solid fuel and liquid fuel consumption (% of total) in Laos. There has been a considerable change from liquid fuels to solid fuels in the country.

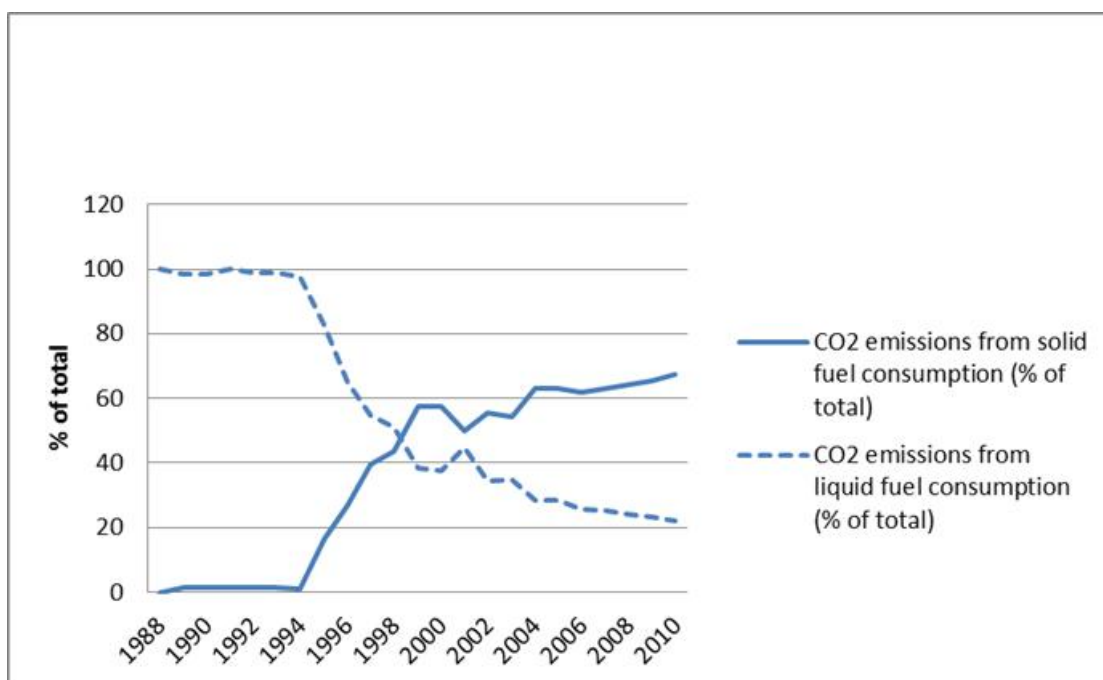


Figure 4.6.12. CO₂ emissions from solid fuel and liquid fuel consumption (% of total) in Laos (World Bank Country Database, 2013).

4.6.3. Scenario analysis of Laotian energy economy

In the following section, four different scenarios for the economics and energy use in Laos are presented. The scenarios are produced with the LaoLINDA model and the basic assumptions of each energy demand scenario are presented in the tables.

A Business as Usual Scenario for Laos (BaU)

The economic growth of the Business as Usual (BaU) scenario for Laos is presented in Fig. 4.6.13 and in Table 4.6.1.

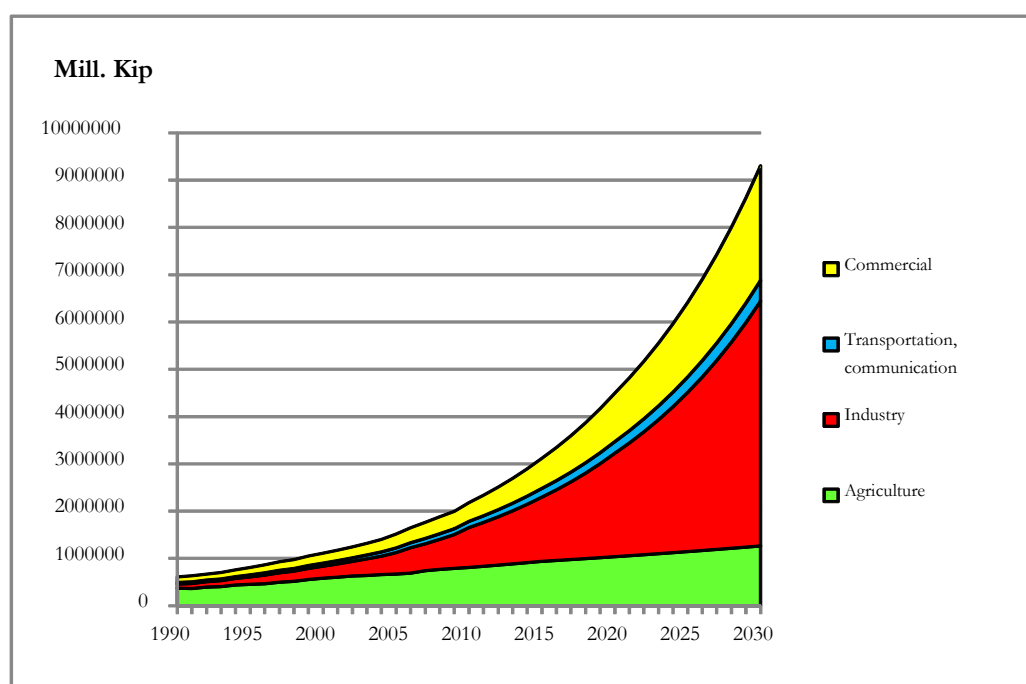


Figure 4.6.13. Economic growth in different sectors in Laos according to the Business as Usual scenario.

Table 4.6.1. Historical and future annual economic growth in different sectors in Laos.

Annual percentual changes								
GDP	The future annual growth rates (%)							
	1990-95	1995-98	1998-2001	2001-06	2006-10	2010-15	2015-20	2020-30
Agriculture	4.1 %	4.4 %	5.4 %	2.7 %	4.1 %	3.0 %	2.0 %	2.0 %
Industry	12.2 %	11.2 %	9.1 %	13.9 %	11.9 %	10.0 %	10.0 %	9.0 %
Transportation, communication	5.8 %	8.7 %	8.0 %	8.8 %	5.7 %	7.0 %	6.0 %	6.0 %
Commercial	6.0 %	6.4 %	5.4 %	7.5 %	5.7 %	10.0 %	10.0 %	9.0 %
Total	5.9 %	6.4 %	6.8 %	6.8 %	7.2 %	7.4 %	7.6 %	7.6 %

The annual economic growth in the BaU scenario is about 7.5%, which is close to the growth target of Lao PDR Government. In the BaU scenario, industrial growth is the main driving force of the economy.

This follows historical developments. Growth in the commercial sector is thought to increase in this scenario due to the growing importance of tourism and other services.

The impacts of the BaU economic growth on electricity consumption in different sectors is shown in Fig. 4.6.14. In this BaU scenario, electricity use in the industrial sector is considerable due to the high electricity intensity of the sector.

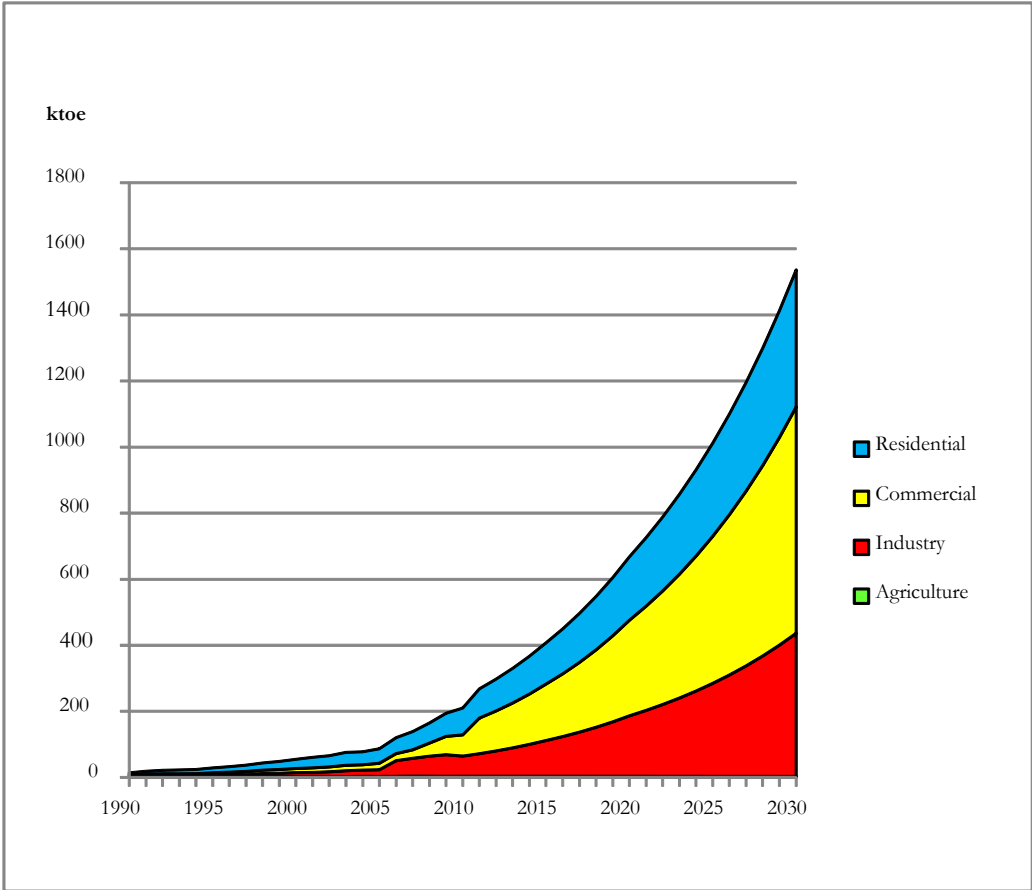


Figure 4.6.14. Electricity consumption in different sectors in Laos according to the BaU scenario.

The total electricity consumption together with exported electricity is shown in Fig. 4.6.15. The growth of electricity export is thought to be considerable according to the plans of increased export earnings and the capacity expansion plans.

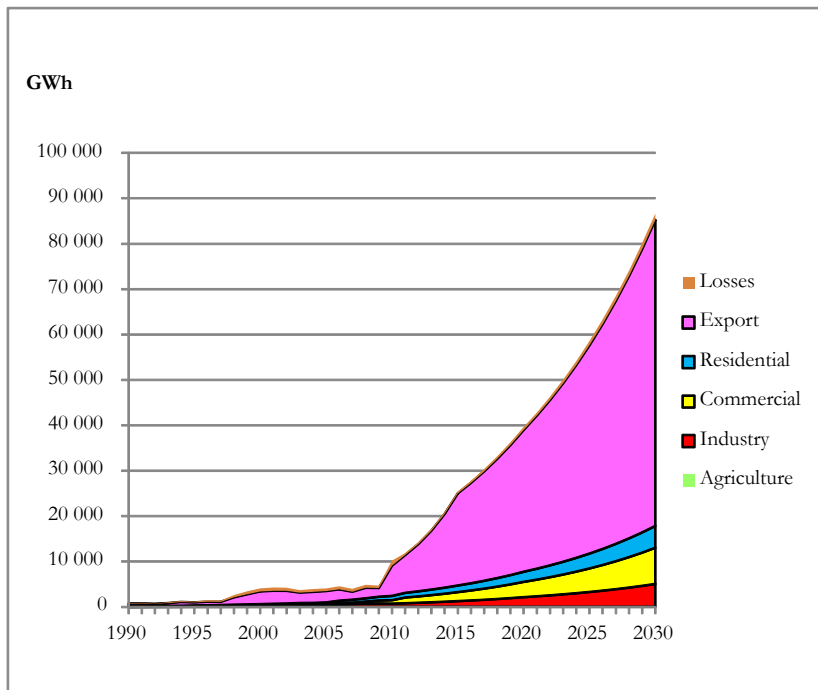


Figure 4.6.15. Electricity consumption and export in Laos in the BaU scenario.

The planned and required electricity production capacity of Laos is presented in Fig. 4.6.16. In this figure, the planned capacity is taken from the existing governmental plans for new production capacity up to the year 2015. The required capacity is calculated with the model. Since the planned capacity is only up to 2015 the production deficit will grow after 2020 according to the model calculation.

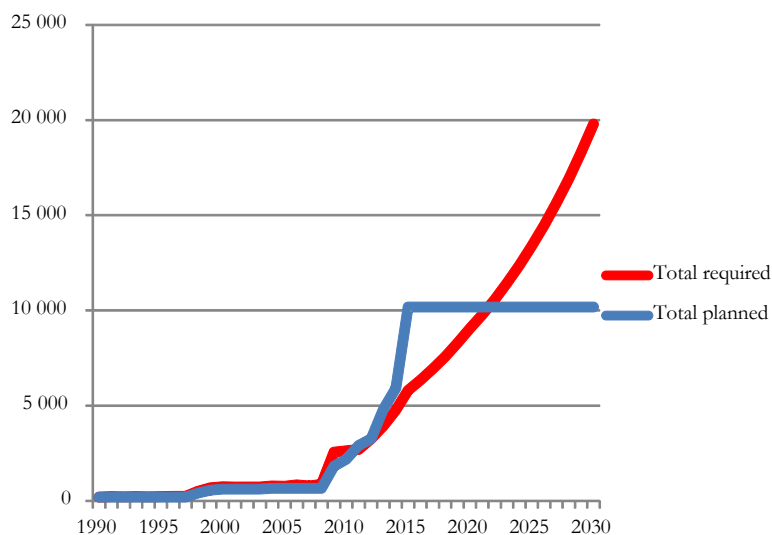


Figure 4.6.16. Planned and required power plant capacity in MW in Laos for domestic and export electricity consumption in BaU scenario.

The sectoral final energy use in the BaU scenario is given in Fig 4.6.17. Residential energy use has dominated the energy consumption in the 1990's but fast growth in the transport sector and other production sectors will change the situation considerably in the future according to the BaU scenario.

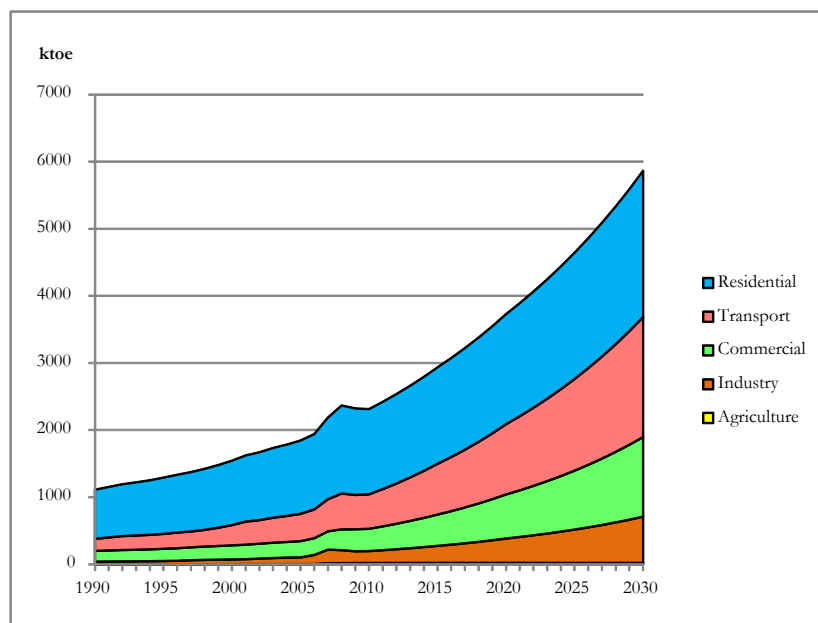


Figure 4.6.17. Final energy use in different sectors in Laos according to the BaU scenario.

The use of different fuels in the Lao economy in the BaU scenario is given in Fig. 4.6.18. Fuel wood has been dominant, but in 2015 the use of coal increases sharply due to the start of the Hongsa Lignite power plant⁶, which will be selling electricity to Thailand. In the BaU scenario there is considerable growth in the transport sector fuel use.

⁶ <http://www.hongsapower.com/index.php>

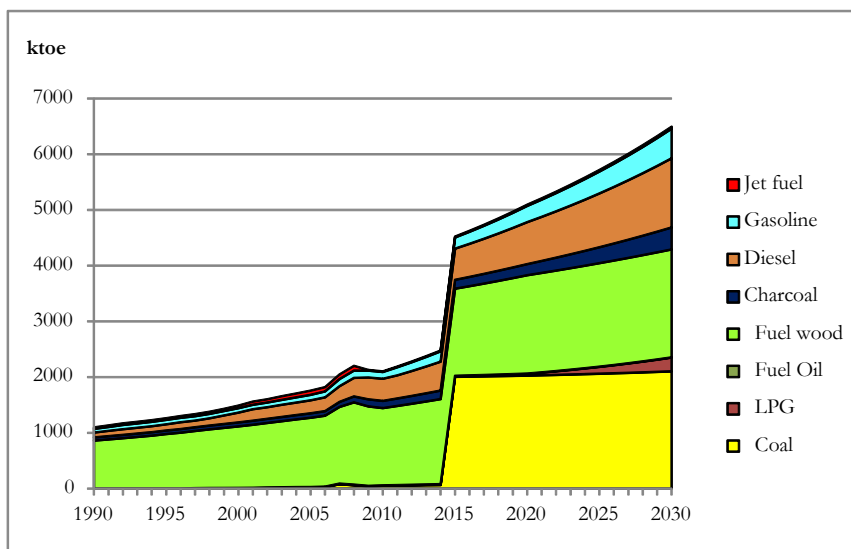


Figure 4.6.18. Use of different fuels in Laos according to the BaU scenario.

Industrial energy use in the BaU scenario is depicted in Fig. 4.6.19. The considerable increase in electricity consumption and coal use in industrial production are the main features of the development.

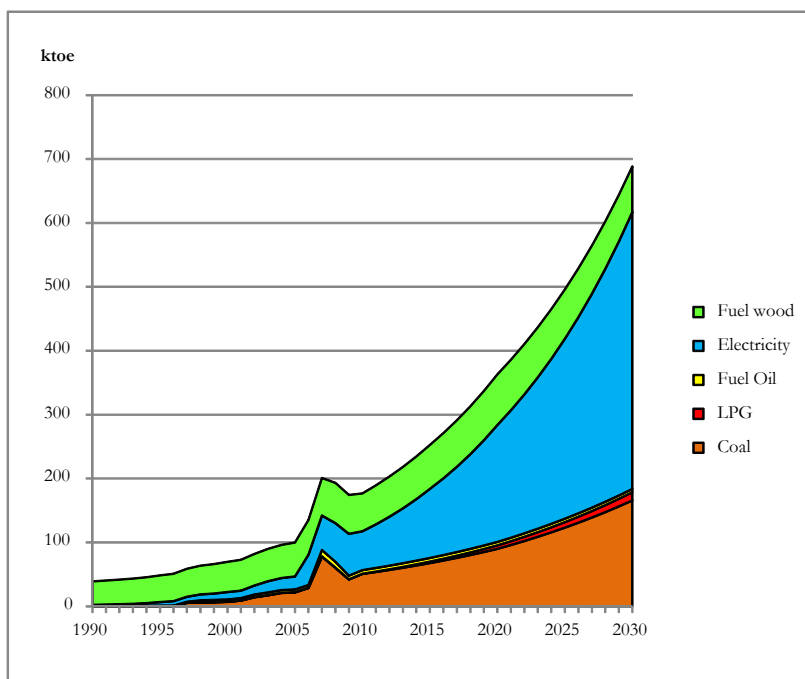


Figure 4.6.19. Energy use in industrial sector in Laos according to the BaU scenario.

The transport sector energy use in BaU scenario is given in Fig. 4.6.20. In the transport sector, the number of private cars as well as mobility and increased freight transport are the main reasons behind the fast growth in diesel consumption.

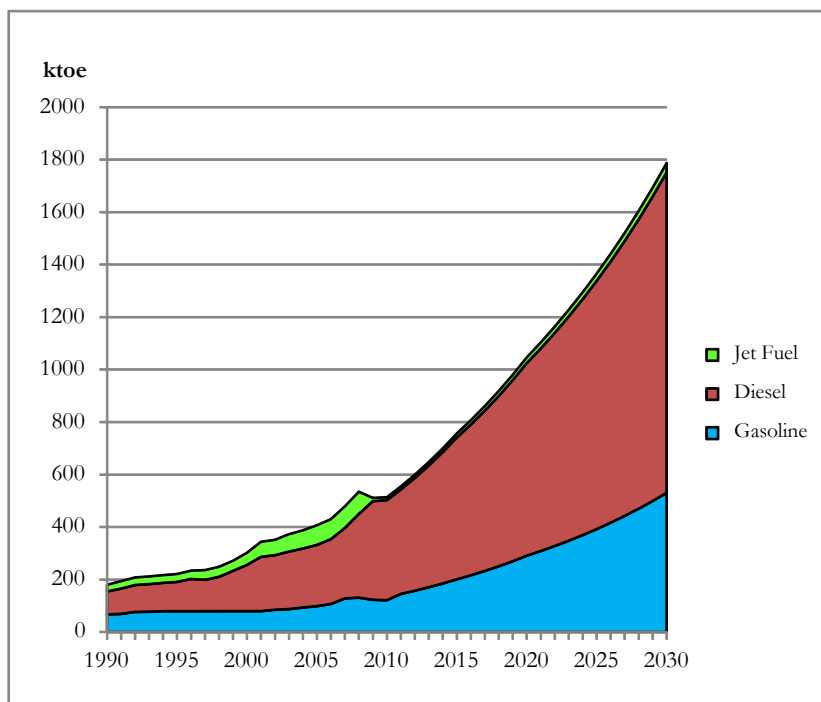


Figure 4.6.20. Energy use in the transport sector in Laos according to the BaU scenario.

In the commercial sector fuel wood has been the dominating energy form, but in the BaU scenario the increase in electricity use and LPG use is considerable. The growth of tourism and related services are main driving factors in this scenario (see Fig. 4.6.21).

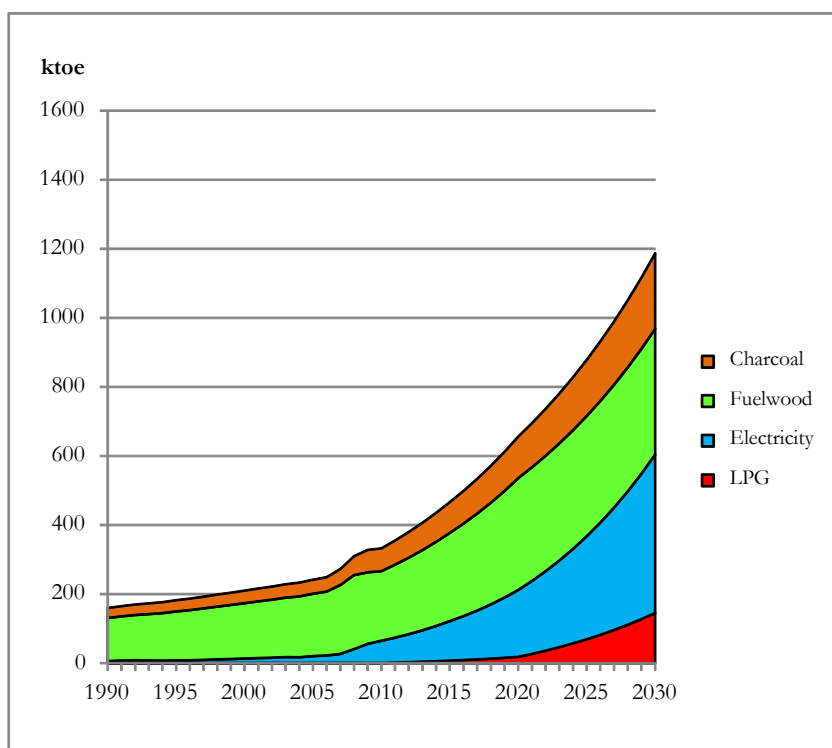


Figure 4.6.21. Energy use in the commercial sector in Laos according to the BaU scenario.

Residential energy use in Laos is dominated by fuel wood which is used for cooking (Fig. 4.6.22). According to the BaU scenario, electricity use will increase considerably due to the increase of households connected to the grid and increased use per household.

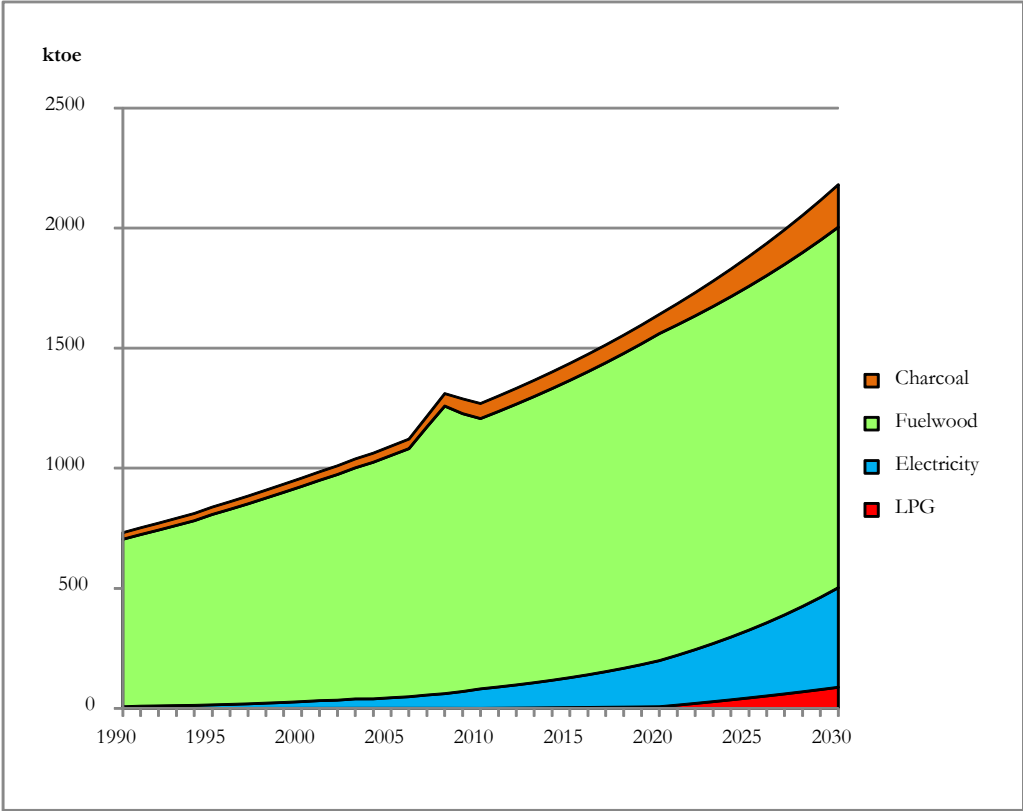


Figure 4.6.22. Energy use in the residential sector in Laos according to the BaU scenario.

Agricultural energy is used mainly for pumping irrigation water and for different machines like two wheel tractors and rice mills. In the BaU scenario (Fig. 4.6.23), the total energy use in agricultural sector is decreasing due to the low growth of production and improved efficiency of machinery.

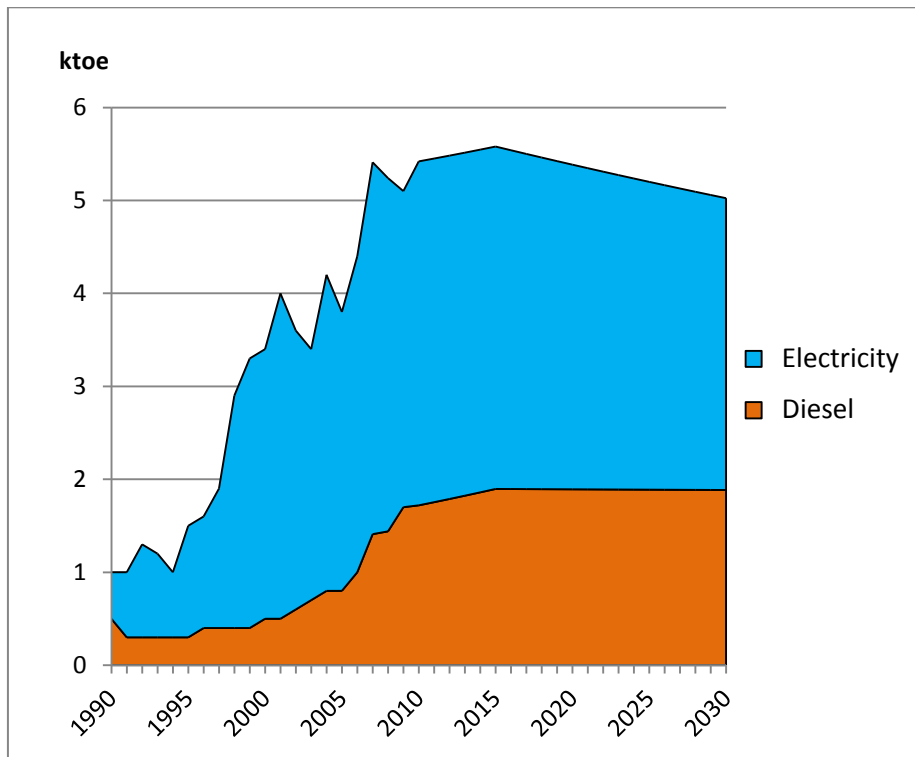


Figure 4.6.23. Energy use in the agricultural sector in Laos according to the BaU scenario.

Fossil fuel use in the BaU scenario produces CO₂ emissions as depicted in Fig. 4.6.24. The emissions grow fast mainly due to the introduction of the Hongsa Lignite power plant and the increased use of petroleum products in transportation. However, the total CO₂ emissions remain at a very low level, equaling less than 0.3 tons of CO₂ per capita in 2010 and 0.65 tons of CO₂ per capita in 2030. In comparison, the world averages at about 4 tons of CO₂ per capita.

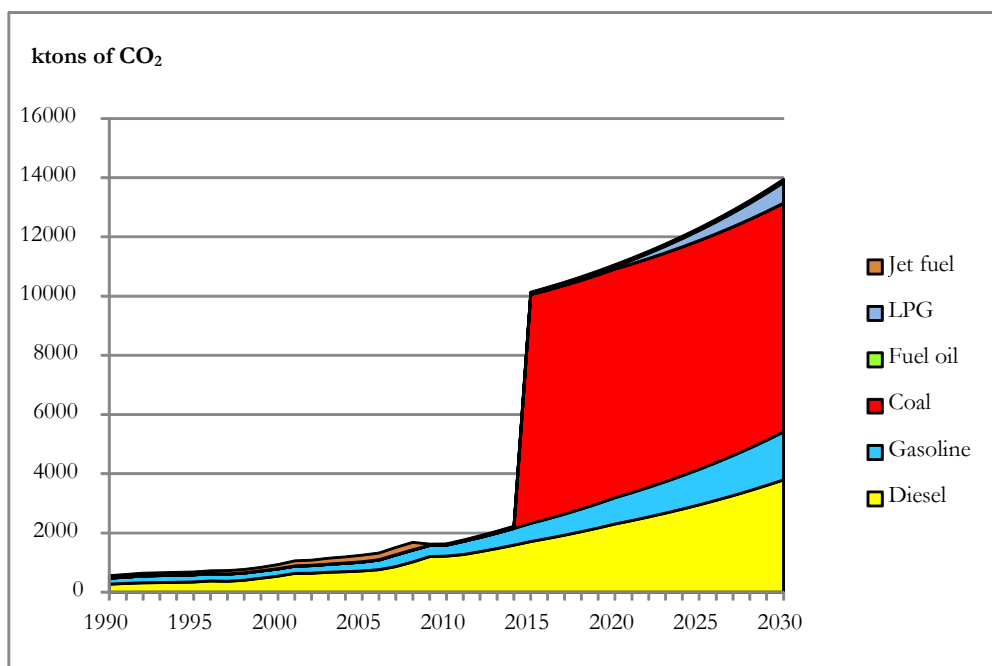


Figure 4.6.24. CO₂ emissions from fuel combustion in Laos according to the BaU scenario.

Mobile Laos Scenario

In this scenario, the mobility of people and goods as well as communication in Laos is thought to increase considerably. In this scenario the value added of transportation and communication is thought to increase while the growth in other sectors is not as high as in the BaU scenario. Total growth of GDP in the ‘Mobile Laos’ scenario (Fig. 4.6.25) is about as high as in the BaU scenario.

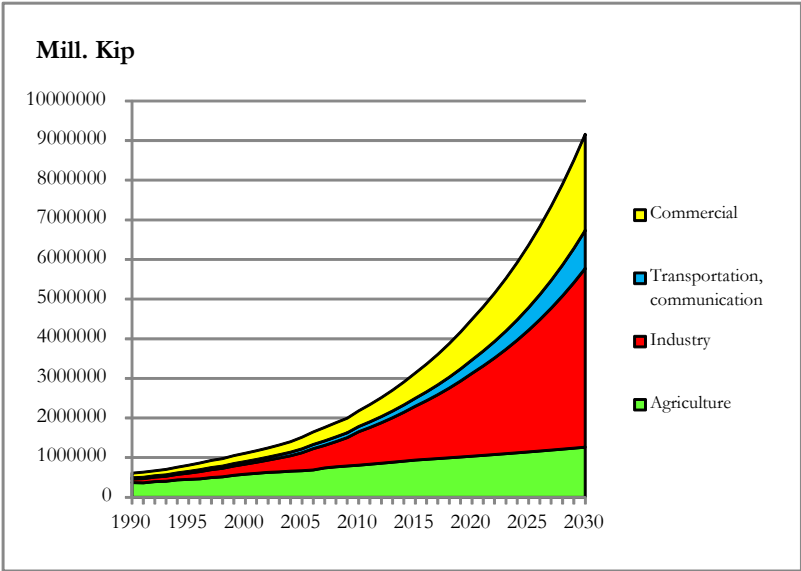


Figure 4.6.25. Economic growth in different sectors in Laos in the ‘Mobile Laos’ scenario.

Table 4.6.2. Annual changes in the value added in different sectors in Laos in the ‘Mobile Laos’ scenario.

Annual percentual changes									
GDP	The future annual growth rates (%)								
	1990-95	1995-98	1998-2000	2001-06	2006-10	2010-15	2015-20	2020-30	
Agriculture	4.1 %	4.4 %	5.4 %	2.7 %	4.1 %	3.0 %	2.0 %	2.0 %	
Industry	12.2 %	11.2 %	9.1 %	13.9 %	11.9 %	10.0 %	9.0 %	8.0 %	
Transportation, communicatior	5.8 %	8.7 %	8.0 %	8.8 %	5.7 %	9.0 %	11.0 %	11.0 %	
Commercial	6.0 %	6.4 %	5.4 %	7.5 %	5.7 %	10.0 %	10.0 %	9.0 %	
Total	5.9 %	6.4 %	6.8 %	6.8 %	7.2 %	7.5 %	7.4 %	7.4 %	

In the ‘Mobile Laos’ scenario, electricity consumption is lower than in the BaU scenario mainly due to the lower growth of the industrial sector as seen in Fig. 4.6.26.

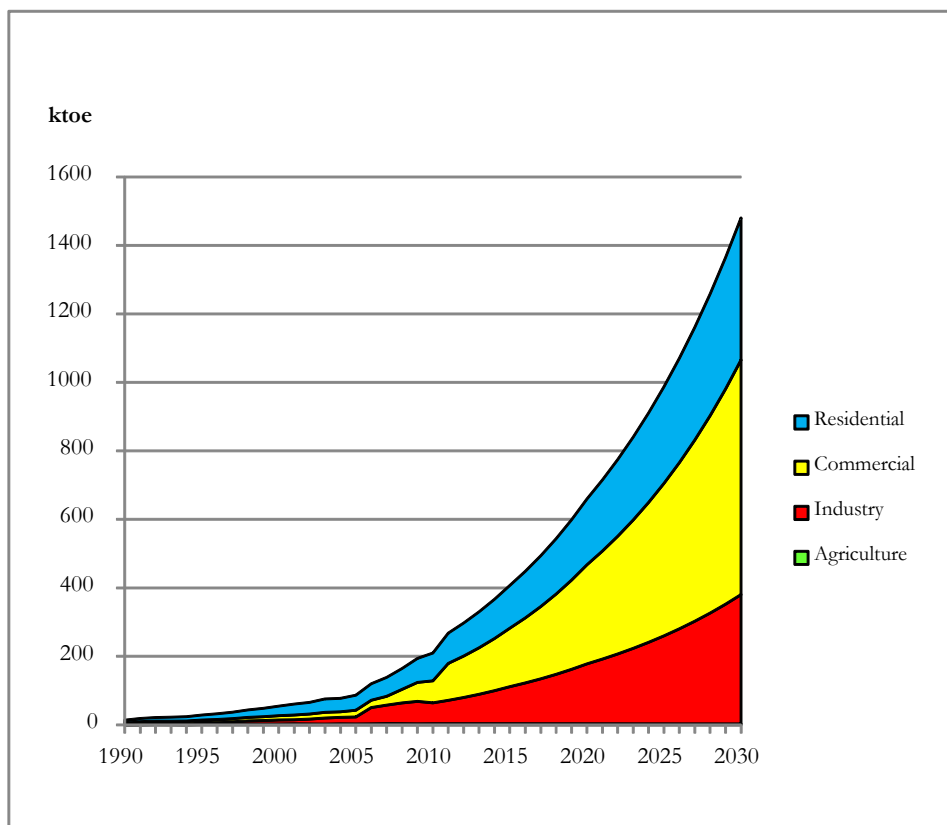


Figure 4.6.26. Electricity consumption in different sectors in ‘Mobile Laos’ scenario.

In the ‘Mobile Laos’ scenario, sectoral final energy consumption clearly indicates fast growth in the transport sector.

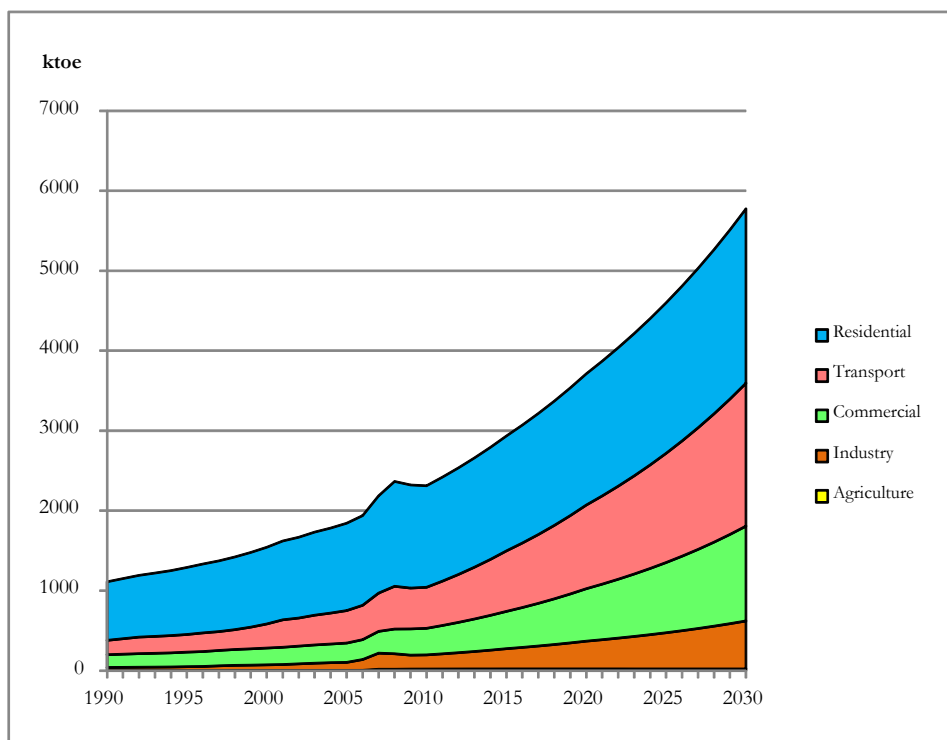


Figure 4.6.27. Sectoral final energy use in the ‘Mobile Laos’ scenario.

Total fuel use in 'Mobile Laos' scenario is presented in Fig. 4.6.28. The considerable growth in transport fuels can be easily seen here as well as in Fig. 4.6.29.

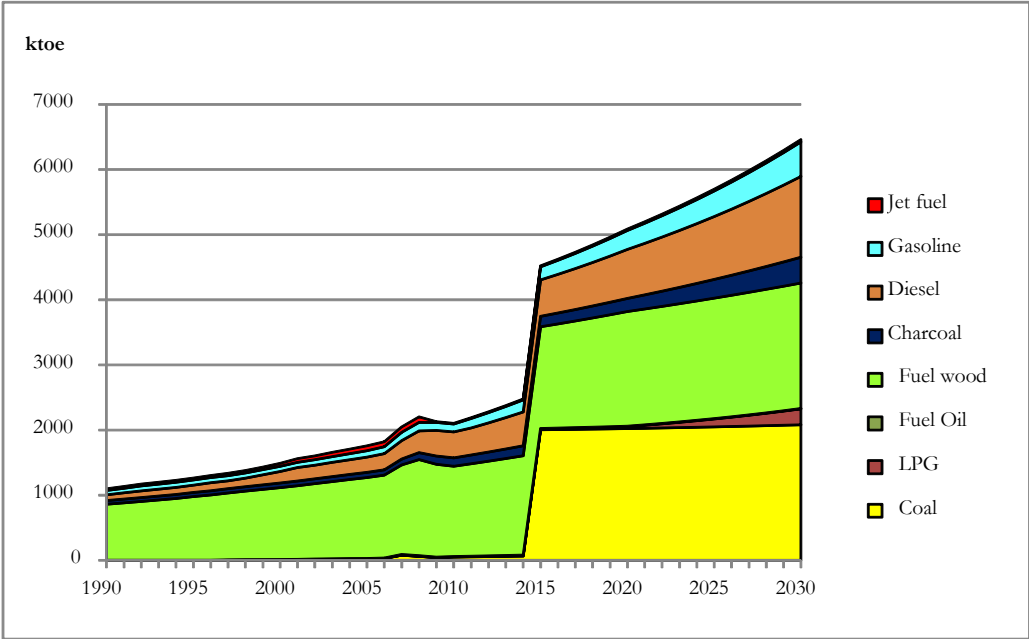


Figure 4.6.28. Use of different fuels in the 'Mobile Laos' scenario.

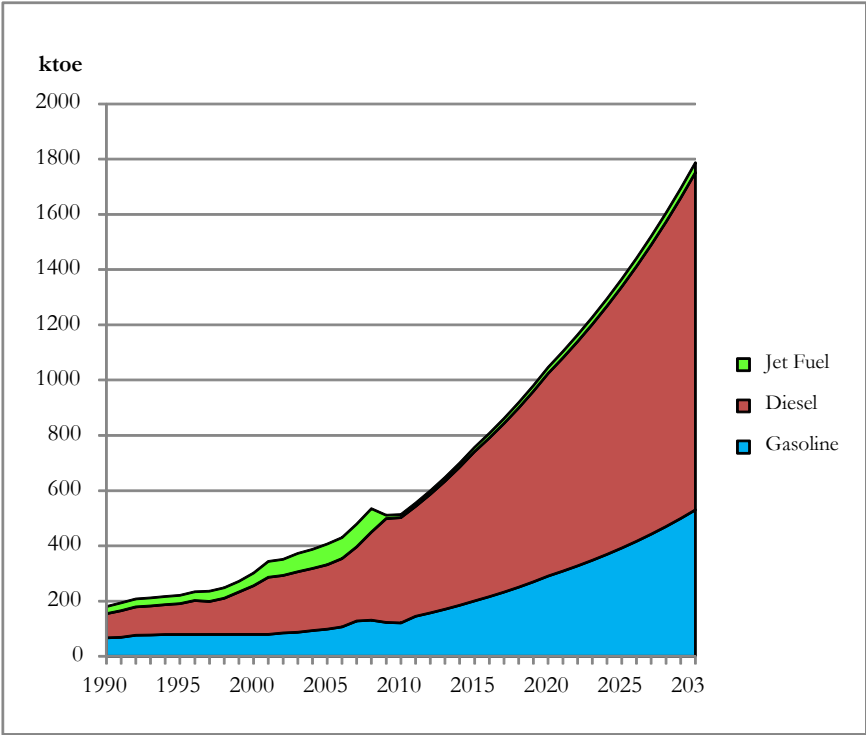


Figure 4.6.29. Energy use in the transport sector in the 'Mobile Laos' scenario.

Industrial Laos Scenario

In the 'Industrial Laos' scenario, the industry sector is growing very fast (Fig. 4.6.30). This is mainly due to the introduction of metal industry in Laos. Other industries also grow and the impacts on commercial and transport sectors can be seen.

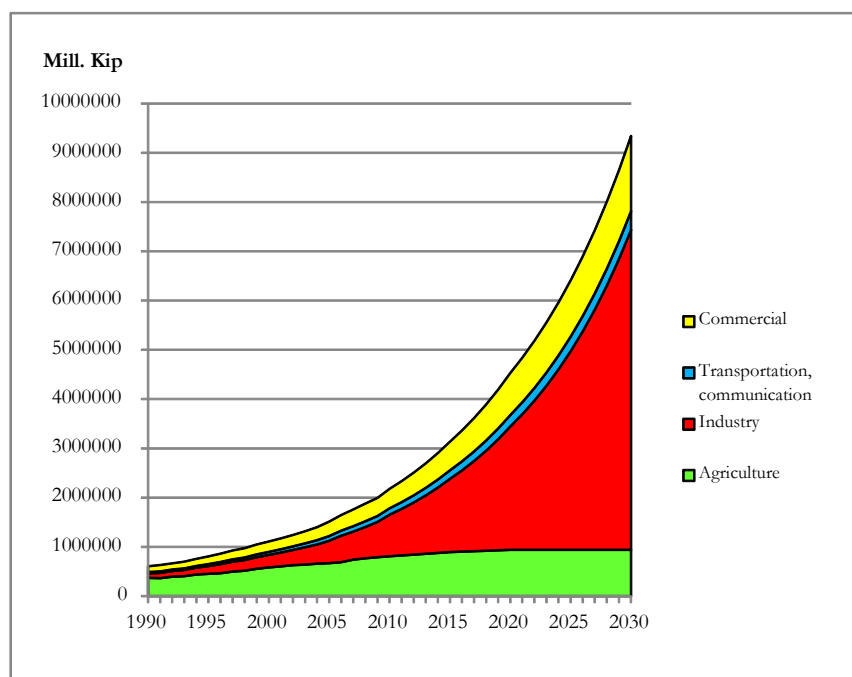


Figure 4.6.30. Economic growth in different sectors in Laos according to the 'Industrial Laos' scenario.

Table 4.6.3. Annual economic growth in Laos in the 'Industrial Laos' scenario

Annual percentual changes									
GDP	The future annual growth rates (%)								
	1990-95	1995-98	1998-2001	2001-06	2006-10	2010-15	2015-20	2020-30	
Agriculture	4.1 %	4.4 %	5.4 %	2.7 %	4.1 %	2.0 %	1.0 %	0.0 %	
Industry	12.2 %	11.2 %	9.1 %	13.9 %	11.9 %	12.0 %	11.0 %	10.0 %	
Transportation, communication	5.8 %	8.7 %	8.0 %	8.8 %	5.7 %	6.0 %	6.0 %	5.0 %	
Commercial	6.0 %	6.4 %	5.4 %	7.5 %	5.7 %	8.0 %	8.0 %	6.0 %	
Total	5.9 %	6.4 %	6.8 %	6.8 %	7.2 %	7.5 %	7.6 %	7.5 %	

The increase in electricity consumption in the 'Industrial Laos' scenario is quite high due to the growth of heavy industry which consumes lot of electricity in the processes, especially in aluminum production.

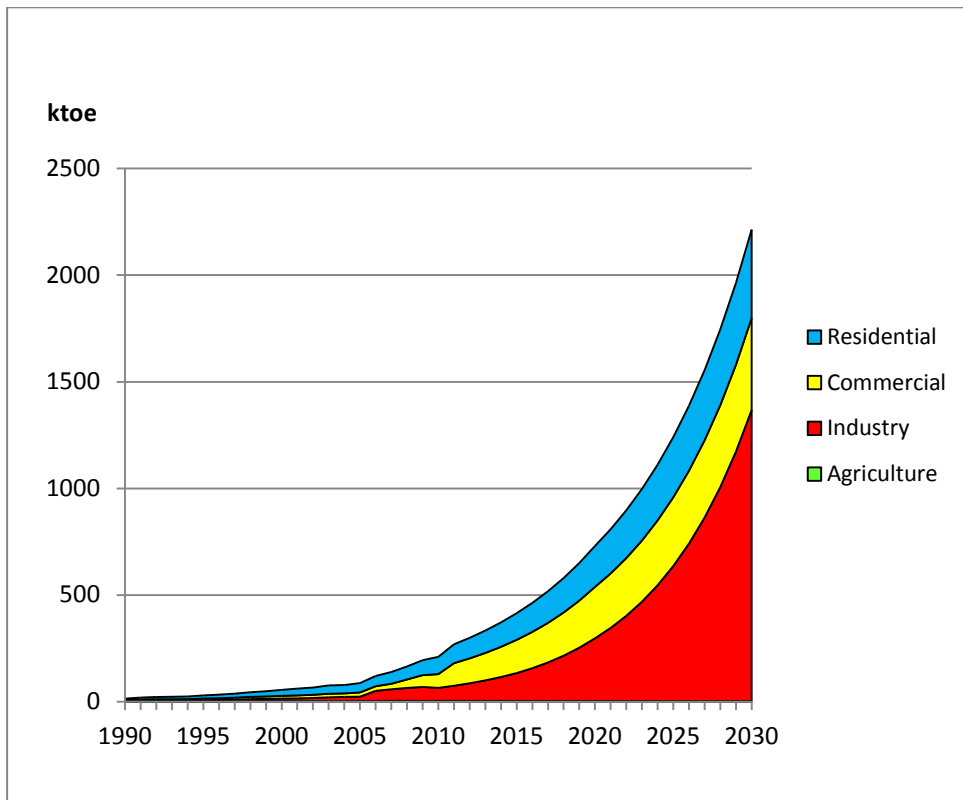


Figure 4.6.31. Electricity consumption in different sectors in the 'Industrial Laos' scenario.

Sectoral final energy consumption and use of different fuels as well as industrial energy use in the 'Industrial Laos' scenario are given in Figs. 4.6.32, 4.6.33 and 4.6.34.

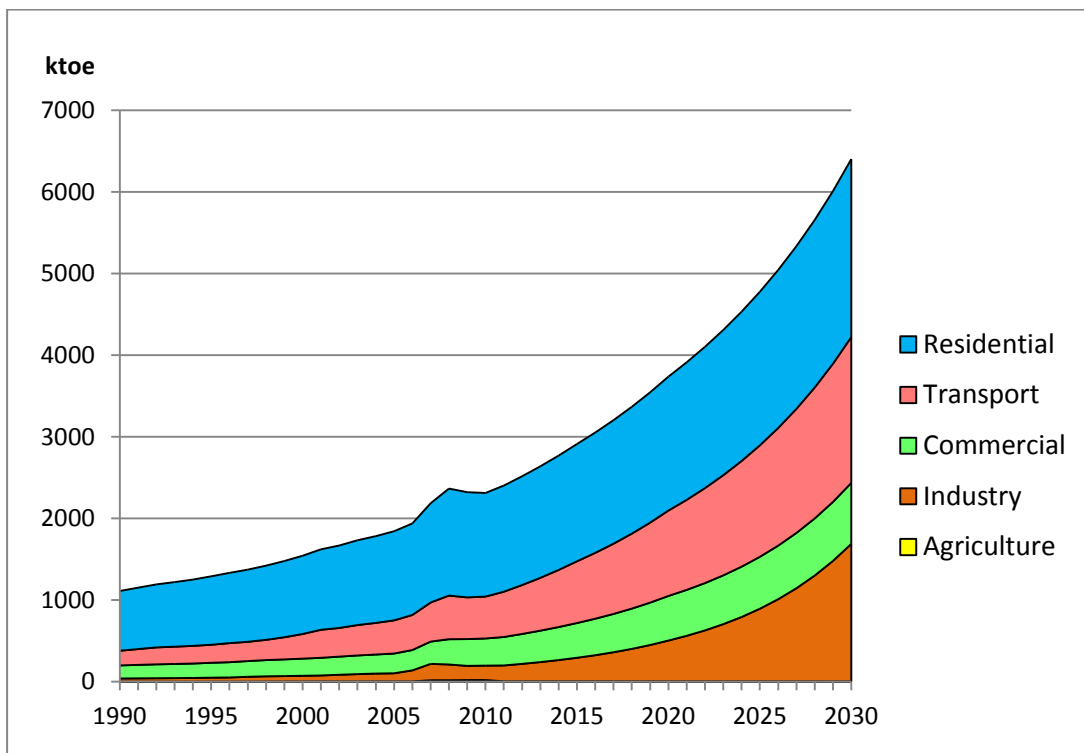


Figure 4.6.32. Sectoral energy use in the 'Industrial Laos' scenario.

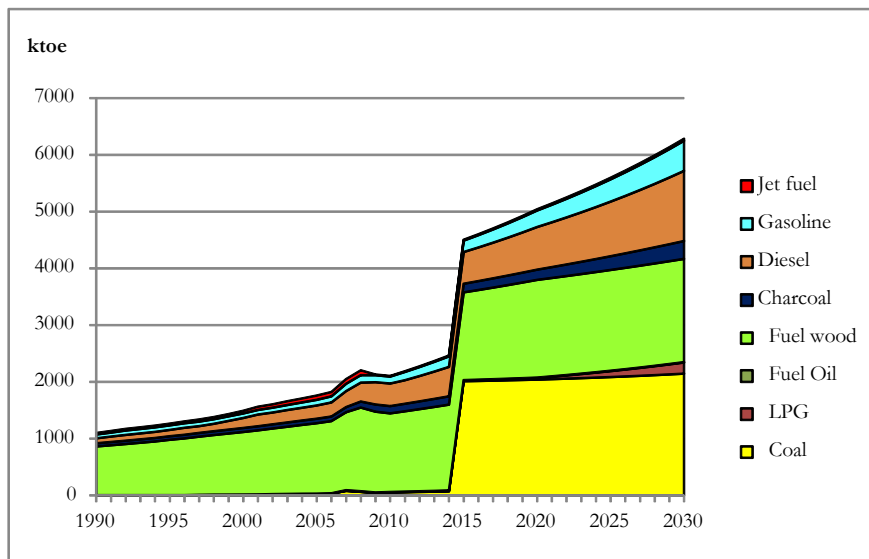


Figure 4.6.33. Use of different fuels in the 'Industrial Laos' scenario.

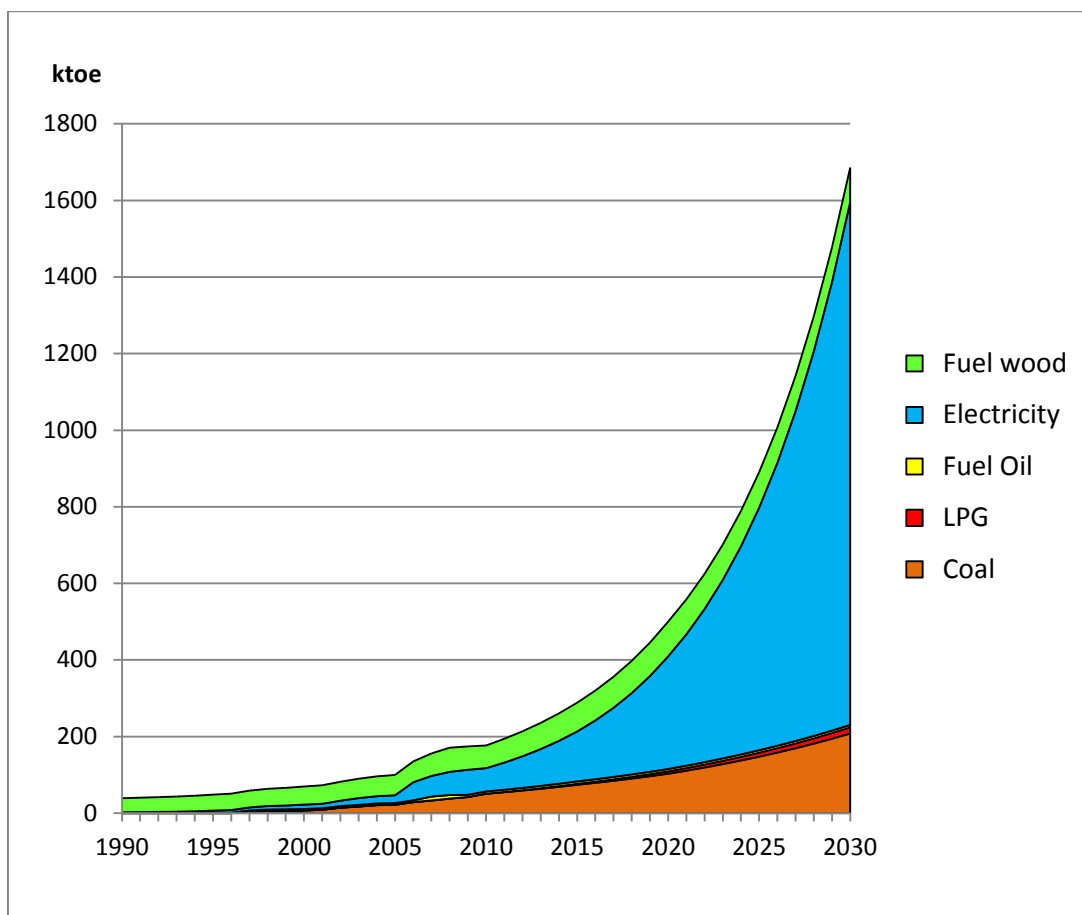


Figure. 4.6.34. Energy use in the industrial sector in the 'Industrial Laos' scenario.

Agroservice Laos Scenario

In the ‘Agroservice Laos’ scenario the agricultural sector and the service sector are growing faster than in other scenarios. In this scenario the agricultural sector is producing higher value added products, such as organic food, for the markets and export. In particular, the growing demand of the Chinese middle class for high quality food products is a driving force in this scenario. In addition, the growth of tourism and related services, including high quality restaurant services, increase the value added of production. Fig. 4.6.35 and Table 4.6.36 indicate the economic development in different sectors in the ‘Agroservice Laos’ scenario.

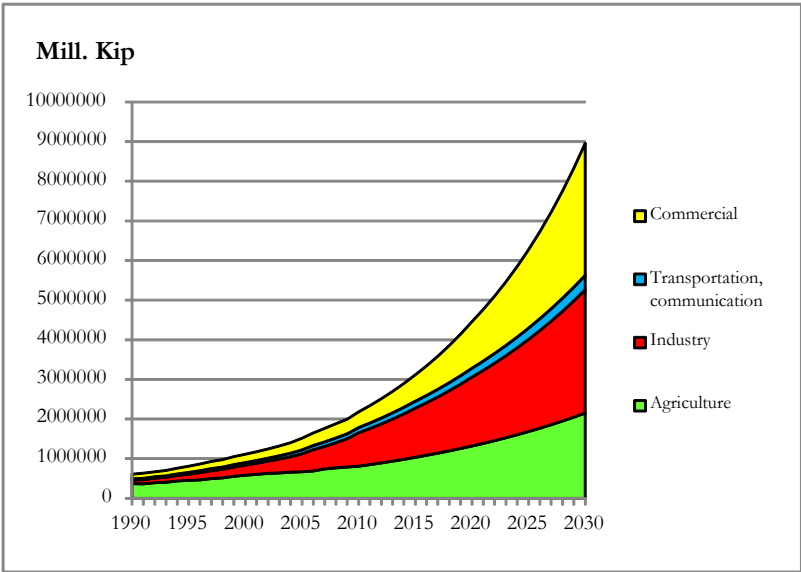


Figure 4.6.35. Economic development in the ‘Agroservice Laos’ scenario.

Table 4.6.4. Annual production growth in different sectors in the ‘Agroservice Laos’ scenario.

Annual percentual changes									
GDP	The future annual growth rates (%)								
	1990-95	1995-98	1998-2001	2001-06	2006-10	2010-15	2015-20	2020-30	
Agriculture	4.1 %	4.4 %	5.4 %	2.7 %	4.1 %	5.0 %	5.0 %	5.0 %	
Industry	12.2 %	11.2 %	9.1 %	13.9 %	11.9 %	8.0 %	7.0 %	6.0 %	
Transportation, communication	5.8 %	8.7 %	8.0 %	8.8 %	5.7 %	6.0 %	5.0 %	5.0 %	
Commercial	6.0 %	6.4 %	5.4 %	7.5 %	5.7 %	11.0 %	12.0 %	11.0 %	
Total	5.9 %	6.4 %	6.8 %	6.8 %	7.2 %	7.4 %	7.4 %	7.2 %	

Electricity consumption in the ‘Agroservice Laos’ scenario (Fig. 4.6.36) is considerably lower than in the ‘Industrial Laos’ and in the BaU scenarios.

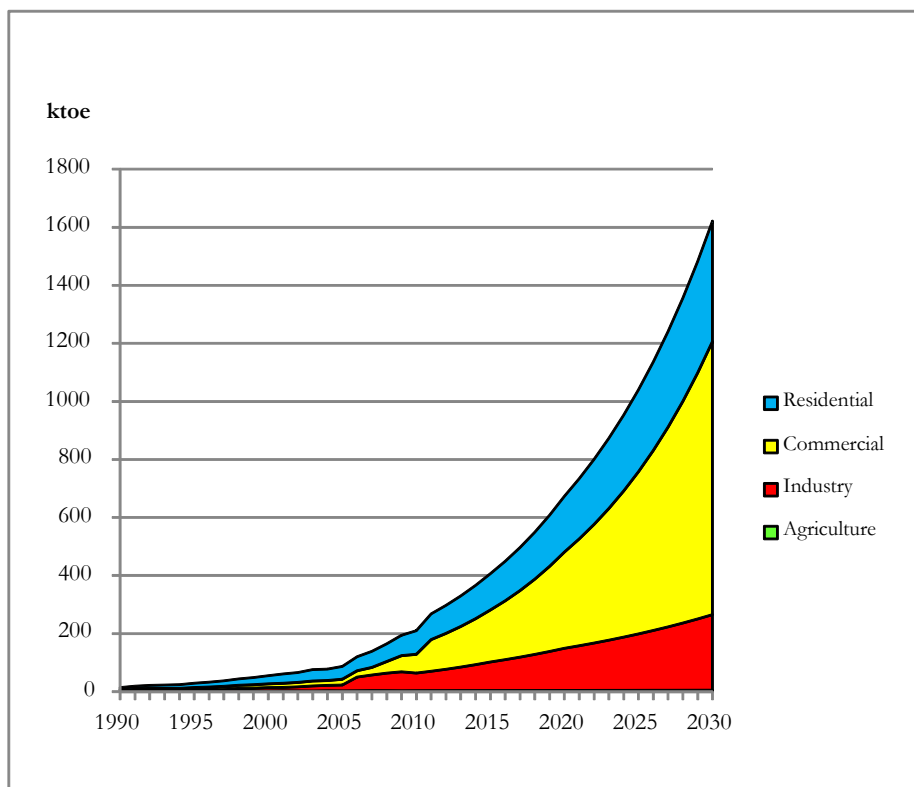


Figure 4.6.36. Electricity consumption in different sectors in the ‘Agroservice Laos’ scenario.

Sectoral final energy use and use of different fuels in the ‘Agroservice Laos’ scenario, are presented in Fig. 4.6.37 and Fig. 4.6.38.

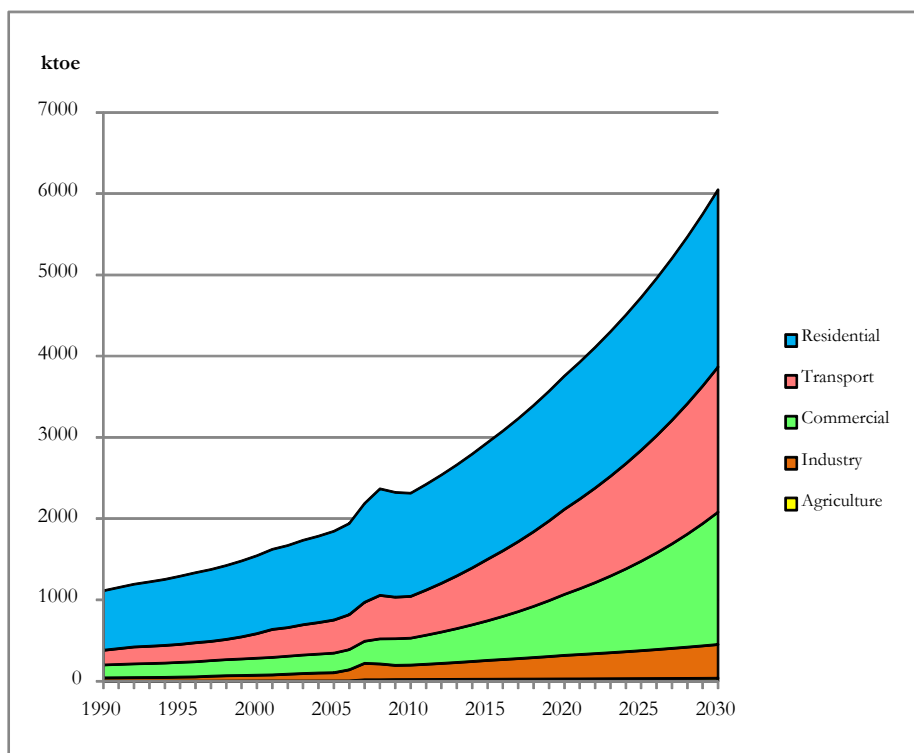


Figure 4.6.37. Sectoral energy use in the ‘Agroservice Laos’ scenario.

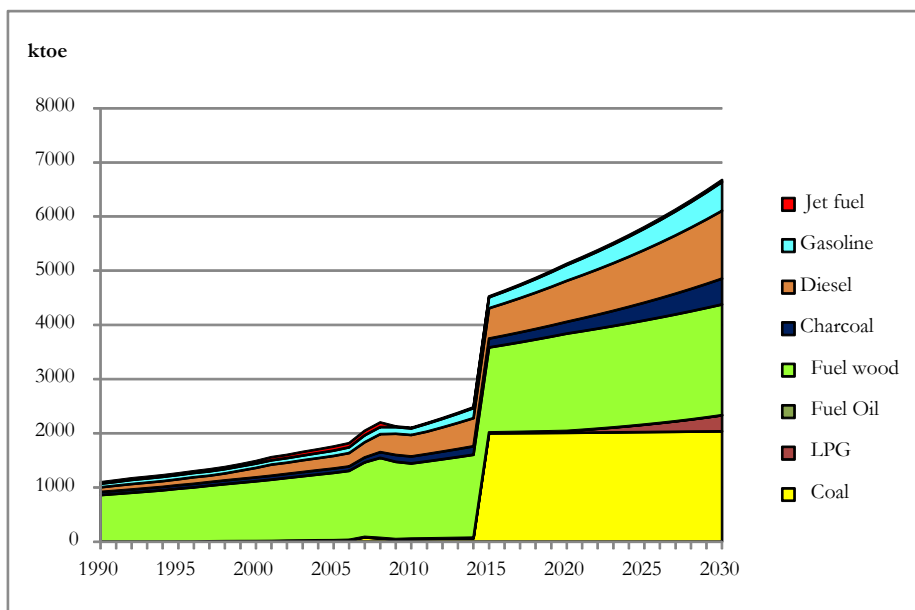


Figure 4.6.38. Use of different fuels in the 'Agroservice Laos' scenario.

Energy use in commercial sector and agricultural sector is depicted in Figs. 4.6.39 and 4.6.40, respectively. In this scenario the energy use in agricultural sector increases due to the considerable growth in production volumes.

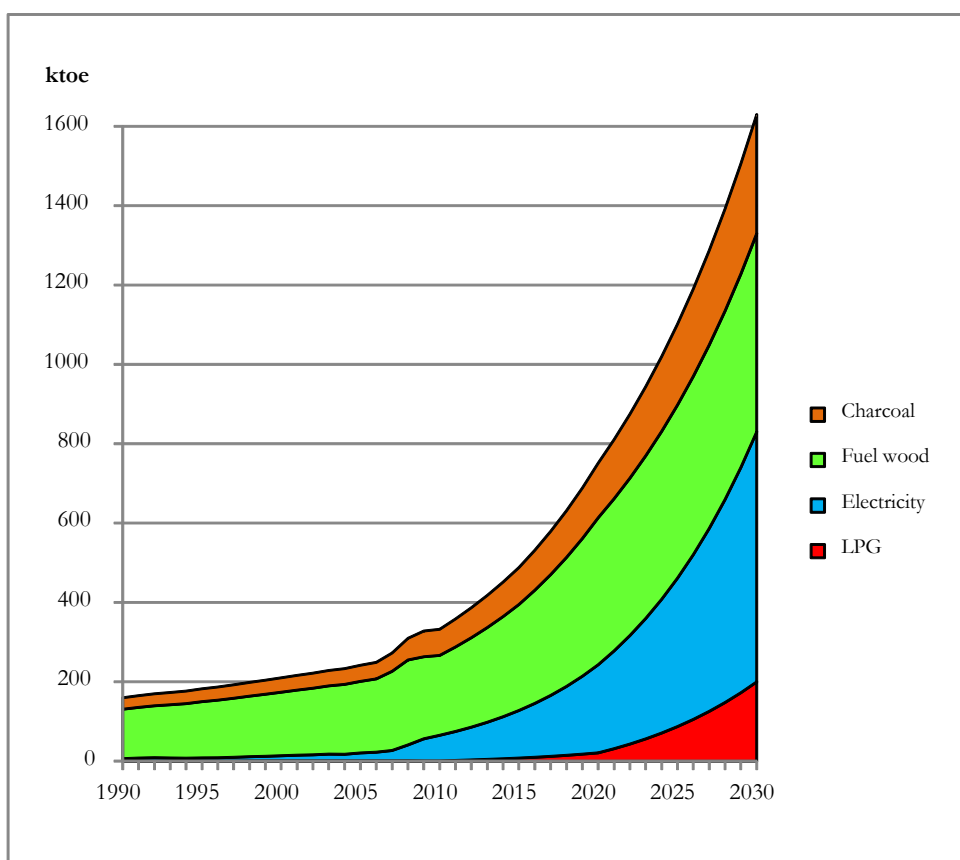


Figure 4.6.39. Energy use in the commercial sector in the 'Agroservice Laos' scenario.

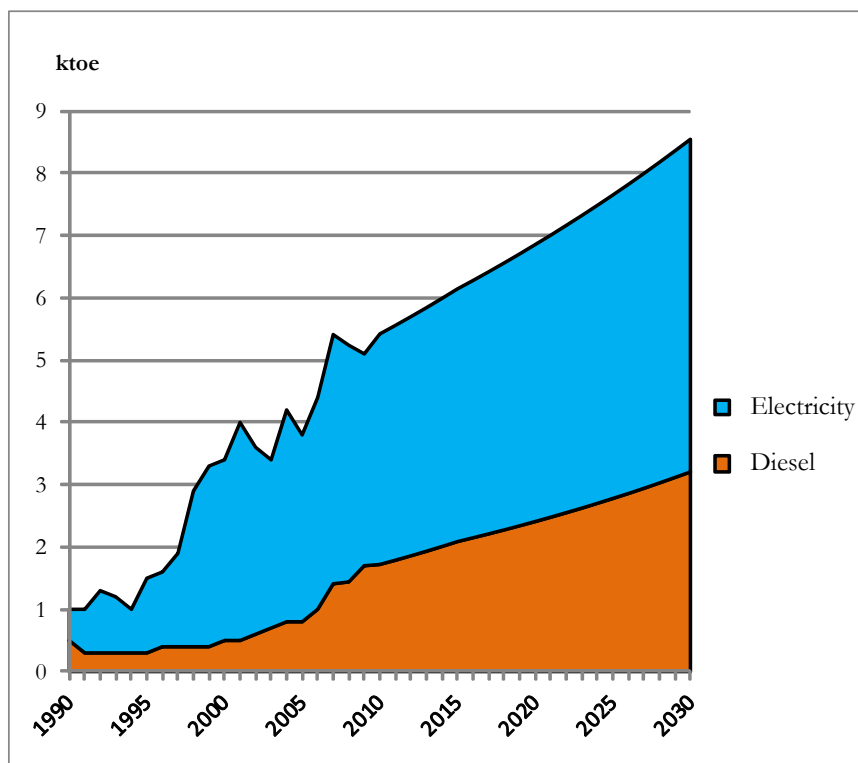


Figure 4.6.40. Energy use in agricultural sector in the ‘Agroservice Laos’ scenario.

4.6.4. Comparisons among different scenarios

Firstly, we will compare GMS Laos base line scenario (Fig.2.9) to LaoLINDA BaU scenario (Fig.14.6.17) for sector final energy use (TFC) (Table 4.6.5). Then LaoLINDA BaU scenario will be compared to other three LaoLINDA scenarios, ‘Mobile Laos’, ‘Industrial Laos’ and ‘Agroservice Laos’ scenarios and also a comparison among these four scenarios is presented (Table 4.6.6). The IPCC (2007, 810) defines the base-line “as the reference for measurable quantities from which an alternative outcome can be measured, e.g. a non-intervention scenario is used as a reference in the analysis of intervention scenarios”. The BaU scenario represents the energy demand scenario that follows the continuation of current trends by using official state-level forecasts and widely accepted national 5-year plans (Luukkanen et al., 2012).

Under the base case of GMS Laos scenario, the economy of the country is projected to undergo a moderate economic development of 5.5% and market-oriented transformation during 2000–2035 whereas the LaoLINDA BaU-Scenario projects the economic development to be higher, around 7.6% which follows the Lao Government economic growth targets.

When comparing GMS Laos base strategy for total final sectoral energy consumption (TFC) to sectoral final energy use in the LaoLINDA BaU scenario we can observe that the TFC of GMS Laos base line scenario (5070,6 ktoe) is 15% lower comparing to LaoLINDA BaU-scenario (5847,1 ktoe) in year 2030. The GMS Laos base line strategy projects that the TFC mix of Laos would grow at the annual average growth rate (AAGR) of 4% during 2000-2035 (Watcharerejyothin and Shrestha, 2009b). The same figure based on the LaoLINDA model is 4.5%.

According to LaoLINDA scenario residential (37%) and transport (31%) sector are high energy consuming sectors of the Laotian economy. High energy use of the residential sector can largely explained by urbanisation process and the fact that the rural electrification programmes bring new consumers to the grid increasing the demand. The economic growth is projected to provide new consumption possibilities for citizens and increased the number of electricity consuming equipment in the households. (Luukkanen et. al., 2014). The base strategy and scenario analysis developed by Watcharerejyothin and Shrestra (2009b) estimate the service sector would consume most of the energy accounting for 32% of the TFC, followed by the industrial (29%), household (23%) and transportation (16%) sectors. Agriculture sector is projected to consume very little energy (less than 1-2%) in both scenarios. The amount of energy consumption of service sector (1602 ktoe) will be 35% higher comparing to LaoLINDA BaU Scenario figure (1186 ktoe) in 2030. Also industrial energy use has projected to be higher in GMS Laos base scenario (29%) comparing to LaoLINDA figure (21%). Watcharerejyothin and Shrestra (2009a) remark that the industrial sector would grow the highest rate at an AAGR of 8% due to rapid industrial development in Laos.

The differences of these two BaU scenarios are largely related to differences in projected economic development rate of the country, and the rate of electricity demand. The 5.5 % growth in GDP of GMS Laos base line scenario would lead to decrease in energy consumption compared to the higher basic growth path of LaoLINDA model (GDP of 7.5%).

Table 4.6.5. Comparison of the GMS-Laos base line scenario to the BaU Linda scenario for sector final energy use (TFC) in year 2030.

	GMS-Laos Scenario	LINDA BaU-Scenario
GDP (annual percentual change)	5.5%	7.6%
TFC (ktoe)	5070,6	5847,1
Agriculture	9,5	5,0
Industry	1320,8	688,3
Residential	1316,0	2180,3
Transport	821,6	1787,0
Commercial/Service	1602,6	1186,5

In the Chapter 4.6.4, the four described growth development scenarios for Laos illustrate different types of growth patterns which result similar overall growth, but differ considerably in the structure of growth. This makes it possible to analyse the different energy requirements of different growth options. The Table 4.6.6 shows the results of the Comparison of the ‘Mobile Laos’, ‘Industrial Laos’ and ‘Agro-service Laos’ scenarios to the Baseline (BaU) scenario in year 2030.

Table 4.6.6. Comparison of the ‘Mobile Laos’, ‘Industrial Laos’ and ‘Agroservice Laos’ scenarios to the Baseline (BaU) scenario in year 2030

	BaU	Mobile Laos	Industrial Laos	Agroservice Laos
GDP	7.6%	7.4%	7.5%	7.2%
TFC (ktoe)	5847,1	5758,5	6403,6	6018,9
Electricity consumption (ktoe)	1536,1	1480,3	2213,8	1621,2
Fuel consumption (ktoe)	6474,3	6441,4	6269,2	6645,4

In these scenarios the annual GDP growth rates pretty equal the growth rates in the BaU-scenario. The future annual economic growth is the highest in the BaU-scenario and lowest in the Agroservice scenario. In the BaU-scenario, industrial growth (mainly mining industry) is the engine of the economy whereas agriculture and service sector are the driving forces of the economy in Agroservice scenario. One essential driving force of the economic growth in the Mobile Laos scenario is the increase of mobility of people and goods and beginning of the switch to service economy and its impacts on energy demand. The establishment of the ASEAN free trade area also induces the development path behind the Industrial and Mobile Laos scenarios.

In the Industrial Lao scenario the energy use (TFC) grows faster than in the Baseline scenario or in the other scenarios. The share of industry sector of TFC is 44% bigger comparing to BaU scenario. The industrialisation normally increases the energy intensity of production while the shift to service economy decreases the intensity. This has been seen in the development paths of Western countries where the shift to service dominated economy has made it possible to reduce the CO₂ emissions during the last decade (Luukkanen et al., 2014).

The most striking difference among the scenarios was found in electricity consumption variable as was shown in Table 4.6.6. The electricity consumption is the highest in Industrial Lao scenario (2213 ktoe) compared with the BAU scenario (1536 ktoe) and other scenarios which can be explained by the expansion of the high energy consuming industries. If the plans to process the large bauxite resources to aluminium in Bolaven Plateu, in Laos will be realized, the growth of electricity demand will be considerable (Luukkanen et al., 2014).

The difference between the BaU and the other three scenarios in terms of the future fuel consumption do not appear significantly different. The highest fuel consumption is projected in the Agroservice Laos scenario (6645,4 ktoe) , and the lowest in Industrial Laos scenario (6269,2 ktoe). The high figure of Agroservice Laos scenario can largely be explained to the expansion of increased mechanisation of agriculture. In the BaU scenario the total energy use in agricultural sector is low due to the low growth of production and improved efficiency of the machinery.

4.6.5. Summary and reflections: Energy scenarios and energy planning

When we look at the different scenarios that are presented above we have to think what could be the driving forces to realize the different scenarios and what are the implications of these energy demand scenarios for the ordinary life of people in Lao PDR.

The developments described in the scenarios do not take place automatically, but they require policy decision and investments. Crucial questions in this regards are where to invest and what kind of foreign investments are available for these purposes. What are the government priorities and where should it allocate the revenues? There is also need to decide actual investment criteria to prioritize investment options.

One possible future development path is industrial development based on the mining of local mineral resources and processing them for global markets. There has been discussion for example of the utilization of the bauxite resources and the start of aluminium production in Laos. The production of alumina from bauxite and further processing of it to aluminium requires huge amount of energy. This can be seen as one possible development path since the mineral and energy resources for the processing do exist in Laos. The possible benefits and related costs of the processing have to be balanced against alternative ways of using these resources, such as direct export of bauxite and electricity. The global market situation and price are important determinants of the economics of the alternatives. In addition, the possible environmental and social impacts related to the utilization of these resources have to be taken into account.

The development of the mining and processing of the mineral resources also requires investments in transport sector infrastructure, in education, and occupational safety, etc. The above mentioned scenarios should be developed in much more detail to take into account all these possible inter-linkages between different sectors that are affected by the development investments. For instance the ‘Agro-service Laos’ scenario should take into account the impacts of the development of small scale processing industry for the organic agricultural products, their transport and trade as well as the required education and training of the producers, changes in land use, availability of productive land and labour force. The negative externalities should be compensated to stakeholders who are suffering from losses

Important questions in the planning process are how to respond to the interlinked challenges. The main drivers of the different development paths should first be analysed carefully. Then the inter-linkages between different sectors and activities should be taken into account. In the planning several possible development paths should be analysed – this means building of different scenarios. Different models should be used in the planning to include different viewpoints. Top-down models provide different views of the processes than bottom-up models as well as different micro, macro and global models. It is also good to remember that every energy scenario includes risks and uncertainties as well as strengths, weaknesses, possibilities and threats. Thus, in participatory planning processes the SWOT analysis and risk analyses could be performed in relevant planning agencies.

In the planning process, feedback from different experts is needed in order to get a balanced view of different problems and alternatives related to the scenarios. One important issue in the development of the planning process is the investment in capacity building. Especially when different energy and resource planning models are used the understanding of their properties, advantages, deficiencies, applicability and

usefulness is important. This point of view is highly important in the contexts of (1) 5 -year plans, (2) natural resource planning, (3) energy production planning and (4) investment planning, (5) educational and capacity planning and (6) planning and forecasting of national and regional electricity consumption.

Energy demand scenarios are one strategic key element of professional energy sector planning. In this summary study we have presented new energy demand scenarios, which are based on best updated data base of Lao PDR planning authorities. In Laos there have not been too many energy demand scenarios and energy planning models before. From this perspective, our analyses are providing vital new information and knowledge for the ministries of Lao PDR. In the future one key challenge is to connect this planning approach to other planning systems of energy sector. Also the integration of other sector planning procedures will be a big challenge. We should avoid isolated “silos” of energy and natural resource planning.



5. BACKCASTING SCENARIOS AND VISIONS: EVALUATION OF KEY TARGETS OF THE LAOTIAN ECONOMY AND NATURAL RESOURCE MANAGEMENT

5.1. Turbulent Economic Growth

The Seventh Five-Year National Socio-Economic Development Plan (2011-2015) is the main document to analyse backcasting scenarios and visions of the Lao PDR. Naturally, future visions of Lao PDR are anchored to macroeconomic growth and better utilization of its resources. In 2006-2010, GDP growth rate of agriculture and forestry was 4,0%. In industry GDP growth rate was 12,6%, in services it was 8,4% and total growth rate of Lao PDR was 7,9%. Differences between actual plan and actual development were considerable. In Fig. 5.1 we have visualised figures of national plan and actual development in 2006-2010.

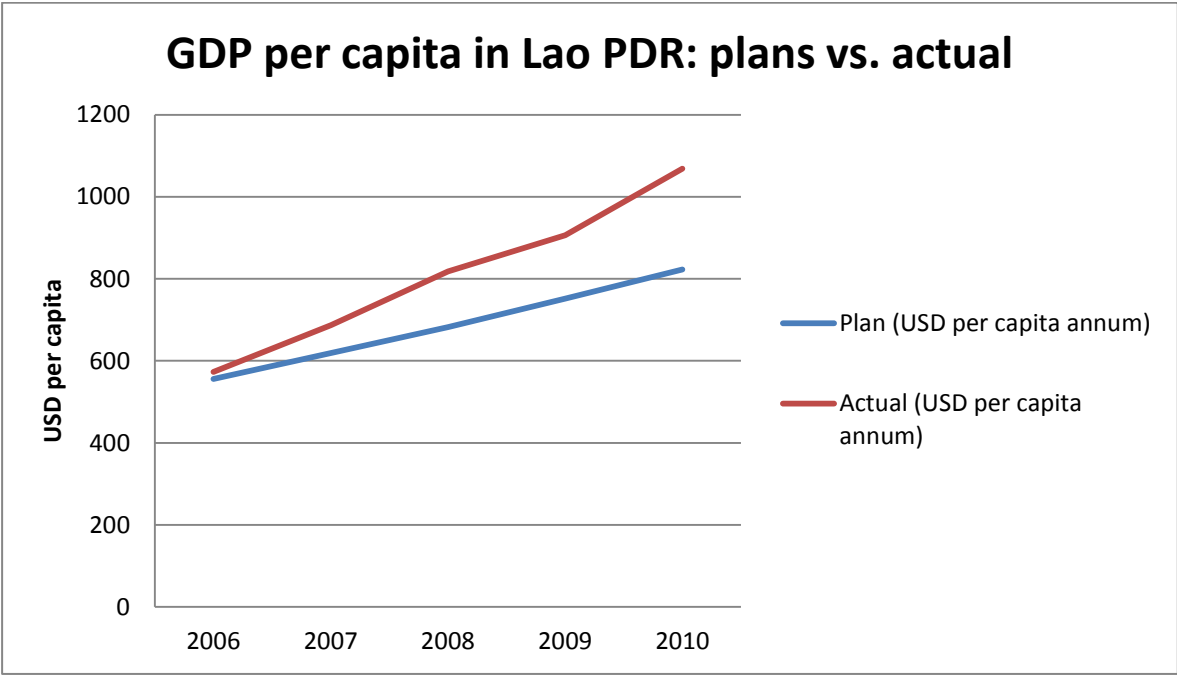


Figure 5.1. GDP per capita, plan and actual 2005-2010 (Ministry of Planning and Investment, 2011, Table 2).

This figure 5.1 verifies old well-known truth of planning, the longer is time horizon, the bigger differences of planned and actual figures are. In 2006 difference was only 3,1%, but in 2010 it was 29,8%. This results indicates that there may be considerable value-added of alternative scenarios and scenario calculations. If we make two alternative scenarios, which follow linear trends, we can get the following robust scenarios and backcasting benchmarks.

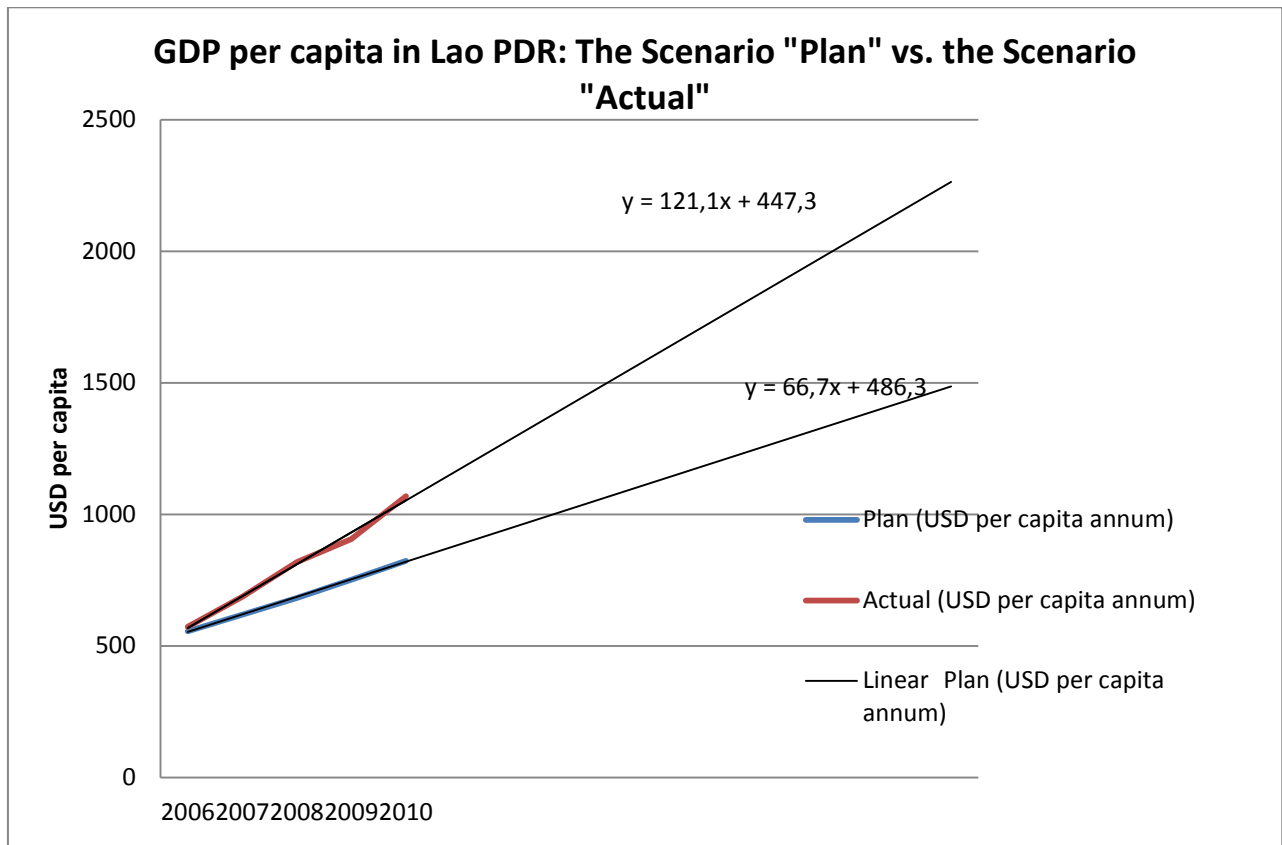


Figure 5.2. GDP per capita, plan and actual 2011-2020 (Ministry of Planning and Investment, 2011, Table 2)

According to the Scenario “Plan” the expected GDP per capita in 2020 would be almost 1500 US dollars per capita. According to the Scenario “Actual” the expected GDP per capita in 2020 could be about 2300 dollars per capita. Probably GDP per capita in Lao PDR will be something in between these two scenarios. In some unstable economic conditions it can be outside these scenario boundaries. Normative, backcasting benchmark level would be lower estimate and explorative, forecasting scenario would be higher according to these numbers of 7th Five Year Plan (Ministry of Planning and Investment, 2011, Table 2). It is quite typical that normative scenarios and “promises” are pessimistically oriented than what we can expect to be economic performance (forecasting scenarios). As we know, psychologically it is always better to perform better than was officially expected. “Official pessimism” is one very typical starting point to analyse backcasting scenarios. According to the targets of the 7th Five-Year Socio-economic Development Plan for 2015 official income per capita target is 1700 USD. This is quite realistic target because it fits quite well with the “Actual” forecasting scenario based on empirical observations 2006-2010.

In Fig. 5.3 we visualise economic growth analysis of 6th 5-Year period in the Lao PDR. We can observe that industrial sector has started to grow rapidly in the Lao PDR. Agricultural sectors show very low growth rates in Lao PDR. Probably financing industrial developments together with investments in hydroelectricity and mining sector will cause financial problems to Laos. All these sectors need much funding and national financial resources are scarce.

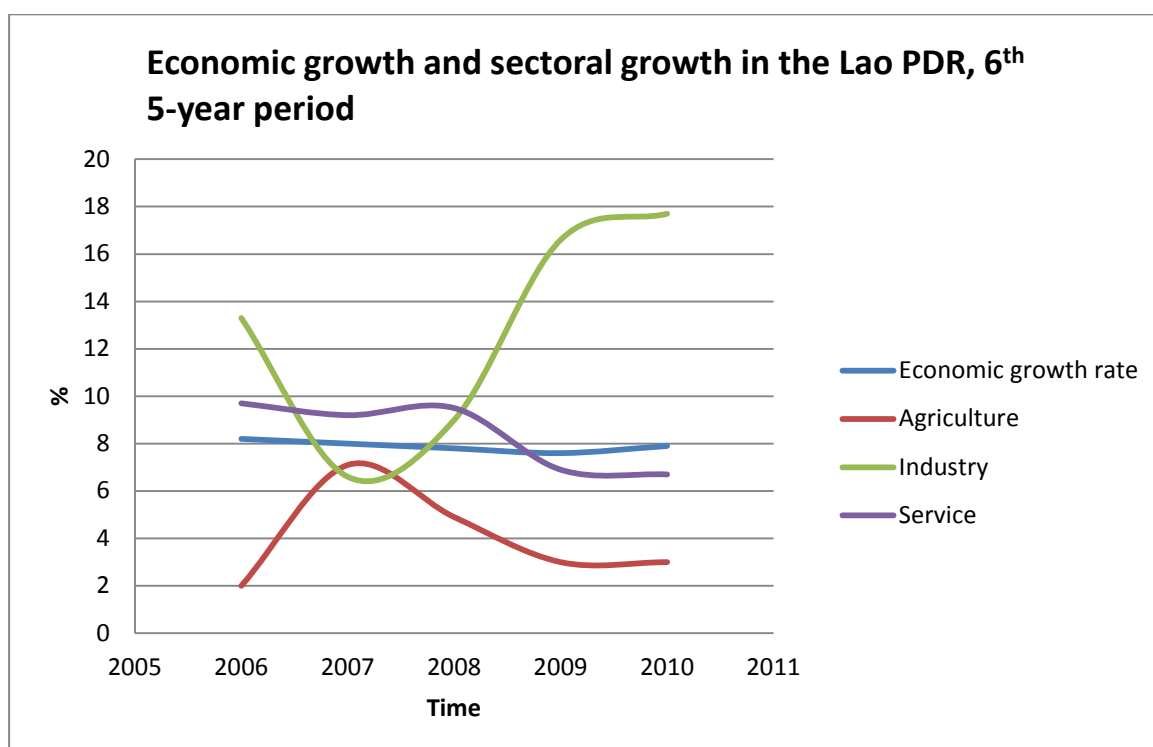


Figure 5.3. Economic growth (total and sectoral growth) in the Lao PDR in 6th 5-Year period (Ministry of Planning and Investment 2011, 202).

In Fig. 5.4 we visualise key financial trend indicators of 6th 5-Year period in the Lao PDR. We can observe that industrial financial balance was improved in 2006-2010, during 6th Five-Year period. Both revenues and expenditures increased since 2008. Current financial situation in Laos is challenging.

In recent years Laos has had more than 8 percent growth, which has been driven by commodities exports and a flood of investment from neighbouring China, Thailand and Vietnam. The Laos stock market, the world's smallest, made its coy debut in 2011. The economic boom in Laos, one of Asia's poorest countries, is not over, but serious cracks are starting to show and IMF economists are worried. Economists warn the country of 6.7 million citizens is facing the downside of a development model based on easy credit, resource exploitation and infrastructure mega projects. Laotian economy is overheating and a range of problems are identified recently. A shortfall in government revenues coupled with ballooning expenditure - particularly rises in pay to public servants - has seen the fiscal deficit rise to about 6.5 percent of GDP. It is quite much. Also inflation is projected to rise to about 7.5 percent by the end of the year 2013, and up to 9.4 percent in 2014. According to anonymous sources of Reuters, Laos's foreign exchange reserves are enough to cover just 80 percent of one month's imports. Western banking and business sources, who have insisted on anonymity, told Reuters that there had been quite serious shortage of U.S. dollars for several months. Thus, signals of financial imbalances are there. Prices have increased in Vientiane and frustration is growing as prices rise and incomes become precarious. (see Belford & Lefevre, 2013).

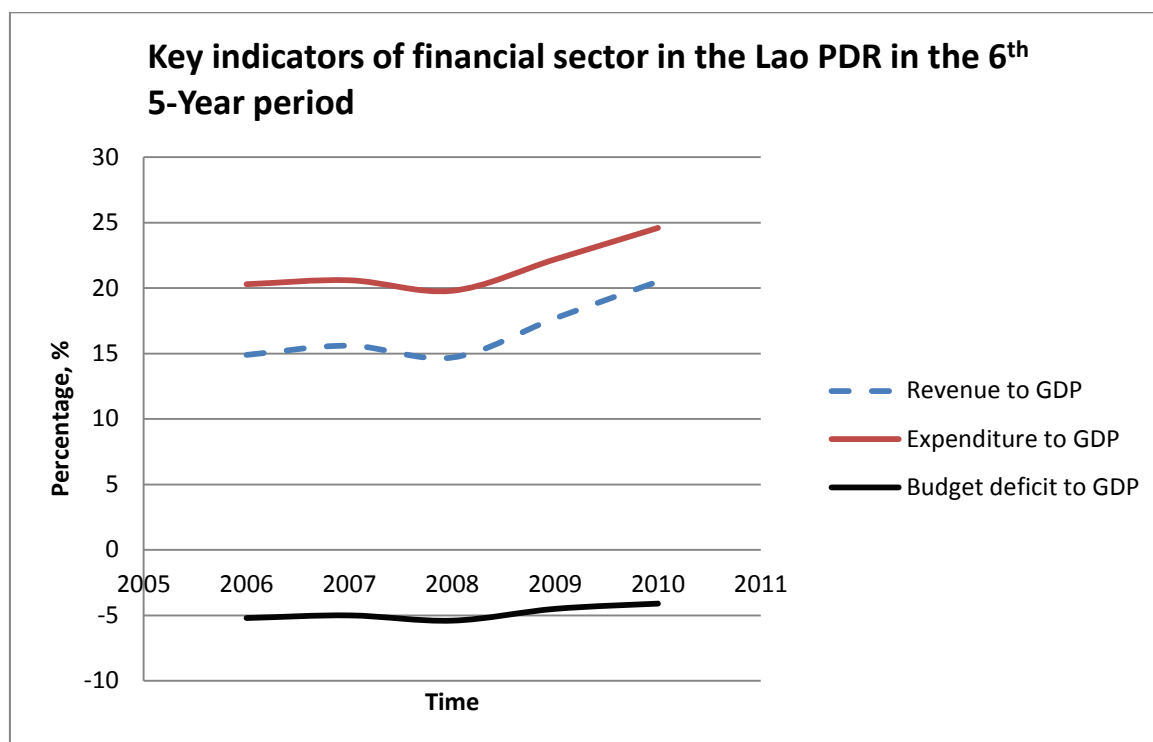


Figure 5.4. Key financial indicators of the Lao PDR in the 6th 5-Year period (Ministry of Planning and Investment, 2011, 205).

5.2. Poverty Analysis of Laos's Provinces

In Laos poverty policy is a starting point for other policy fields. This is a reason why we present an analysis concerning regional and provincial poverty indices. This analysis is based on the statistical appendix of the 7th Five Year National Socio-Economic Development Plan (2011-2015) (Ministry of Planning and Investment, 2011, 207).

If donors and other stakeholders want to tailor their support with the priority of poverty policy, these analyses may be helpful in setting priorities of the ODA allocations.

In Fig. 5.5 we report average household consumption/month (kips) in Laotian provinces and regions, for years 2003 and 2008.

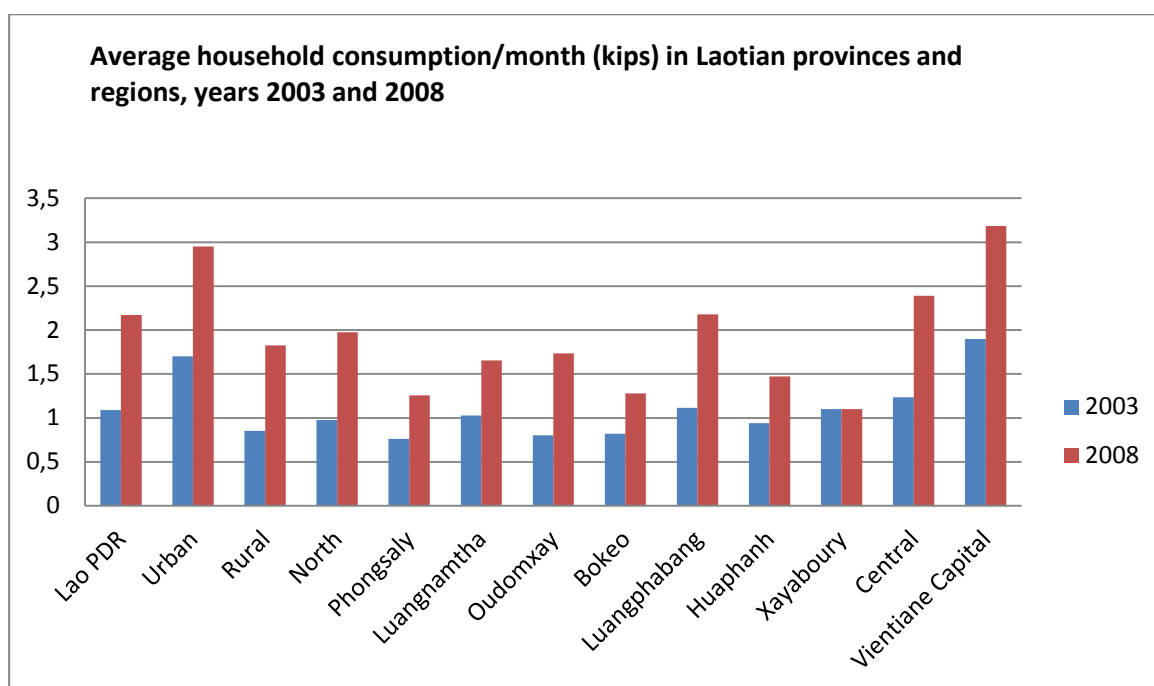


Figure 5.5. Average household consumption/month (kips) in Laotian provinces and regions. (Ministry of Planning and Investment, 2011).

In Fig. 5.6 we report poverty ratio in Laotian provinces and regions, for years 2003 and 2008.

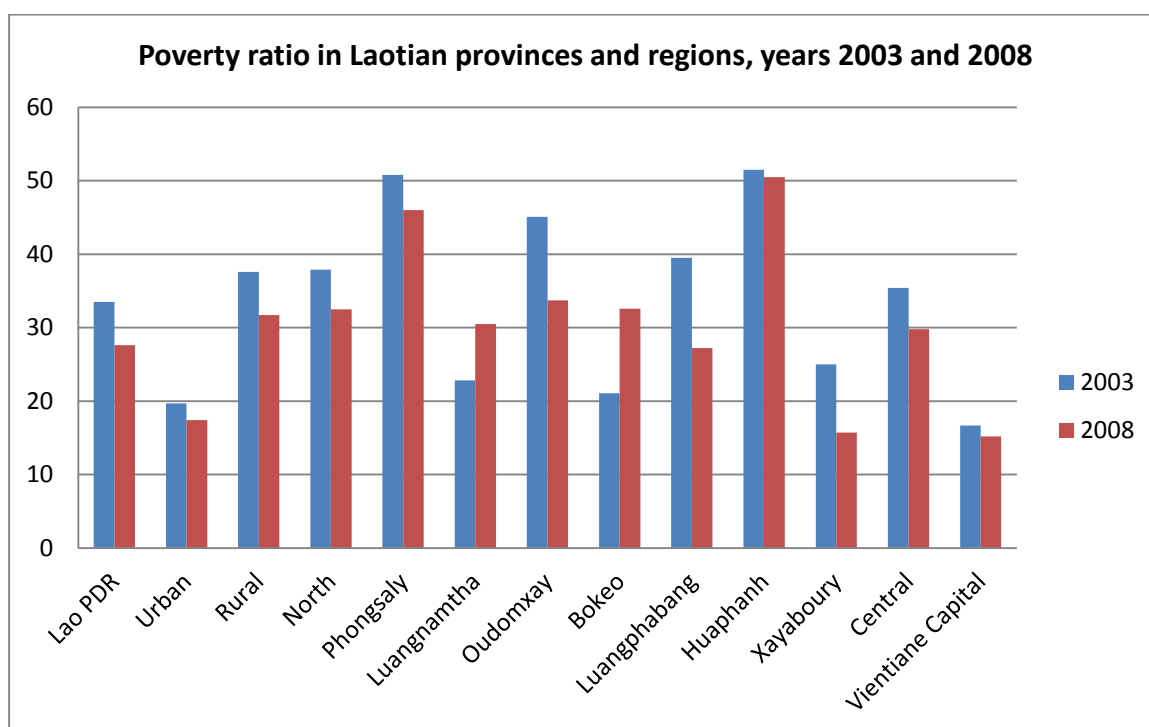


Figure 5.6. Poverty ratio in Laotian provinces and regions, for years 2003 and 2008 (Ministry of Planning and Investment, 2011, 207).

In Fig. 5.7 we report poverty gap in Laotian provinces and regions, for years 2003 and 2008.

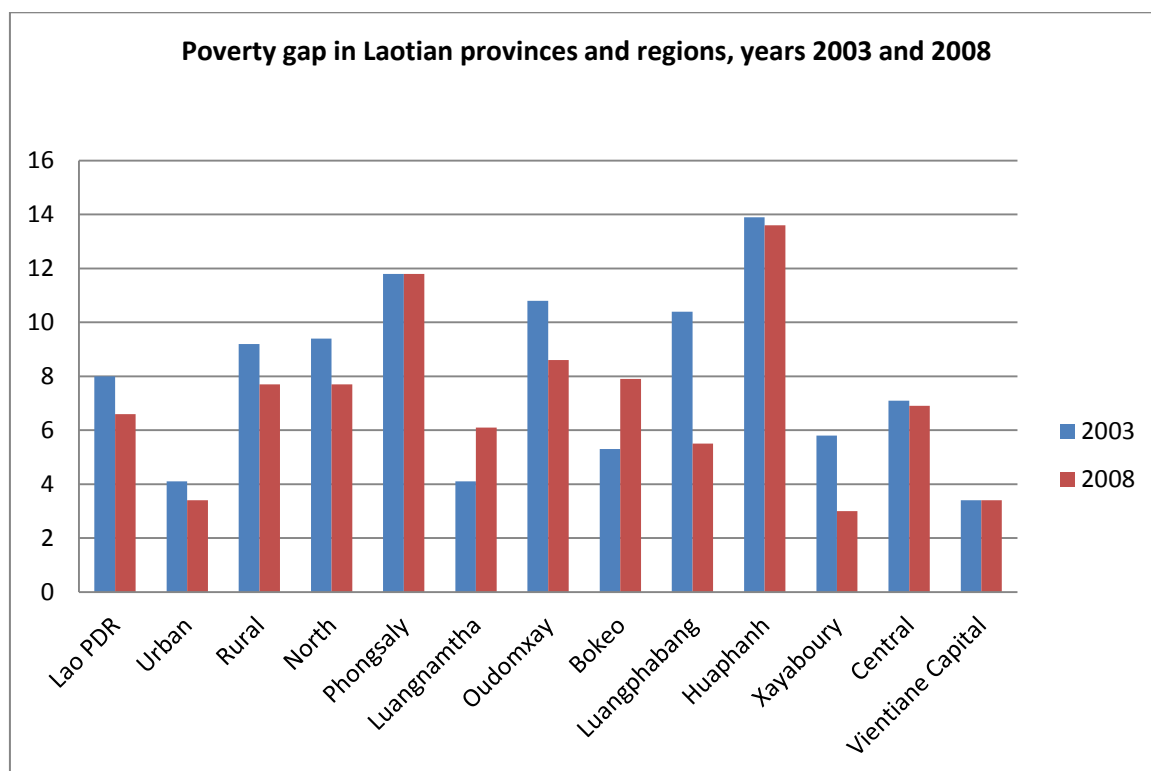


Figure 5.7. Poverty gap in Laotian provinces and regions, for years 2003 and 2008 (Ministry of Planning and Investment, 2011, 207)

In Fig. 5.8 we report poverty intensity indices in Laotian provinces and regions, for years 2003 and 2008.

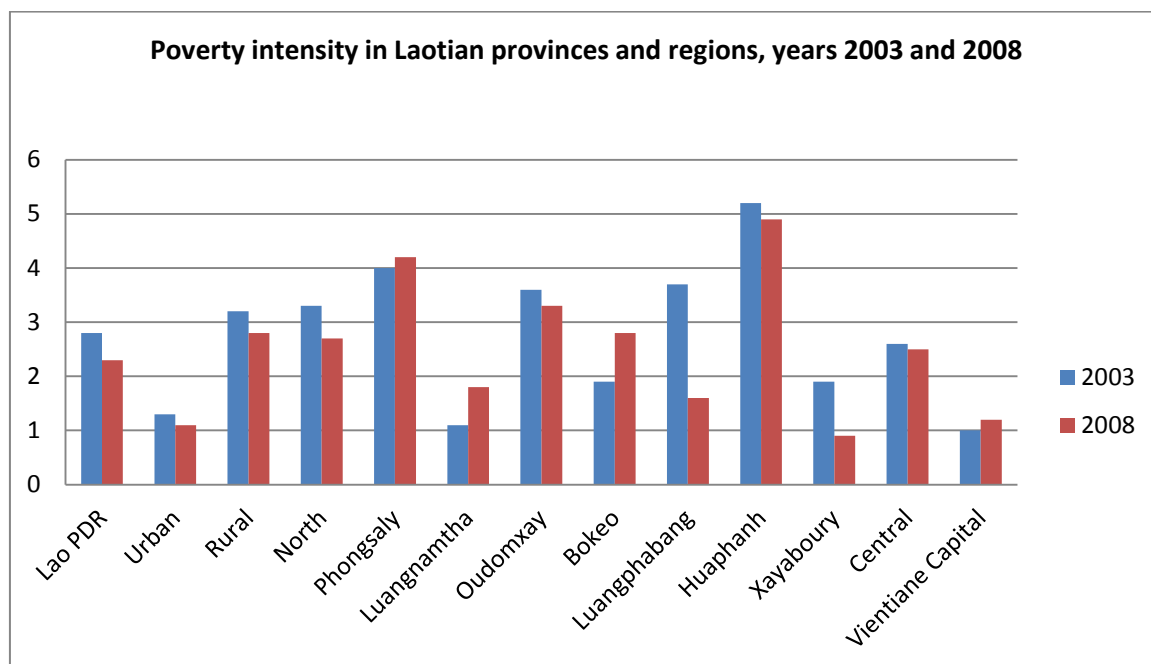


Figure 5.8. Poverty intensity in Laotian provinces and regions, for years 2003 and 2008 (Source: Ministry of Planning and Investment, 2011, 207).

In Fig. 5.9 we report inequality statistics in Laotian provinces and regions, for years 2003 and 2008.

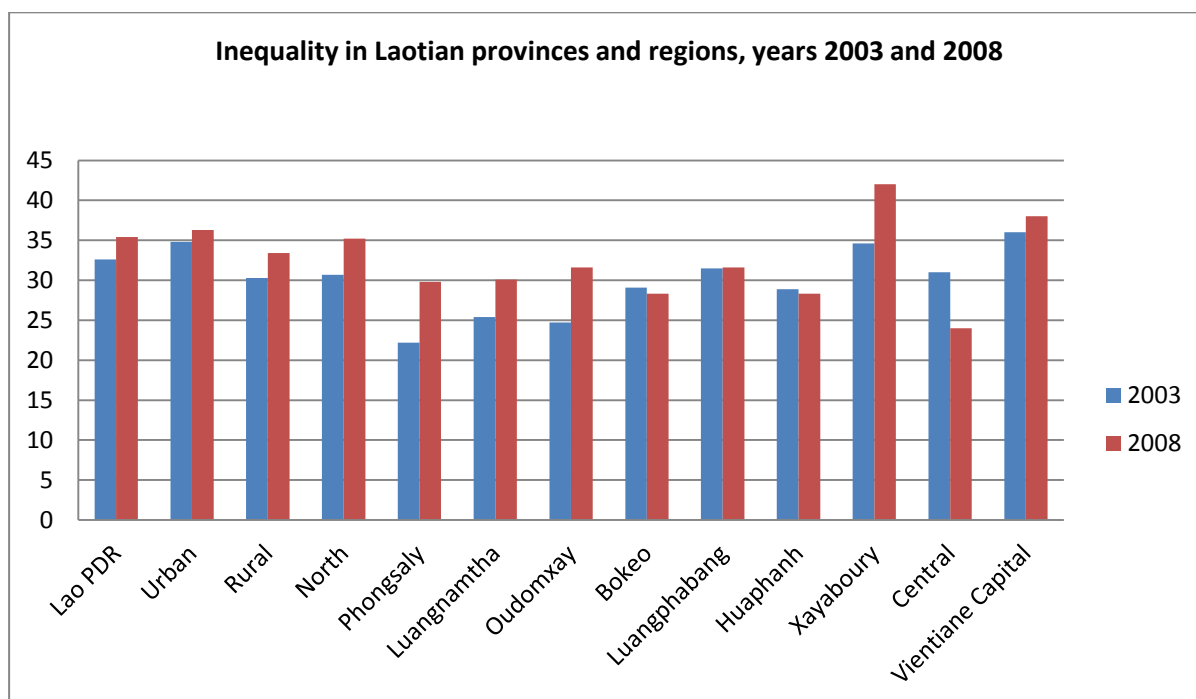


Figure 5.9. Inequality in Laotian provinces and regions, for years 2003 and 2008 (Source: Ministry of Planning and Investment, 2011, 207).

In Fig. 10 we present a visualization of poverty ratio and inequality in the Lao PDR in 2008.

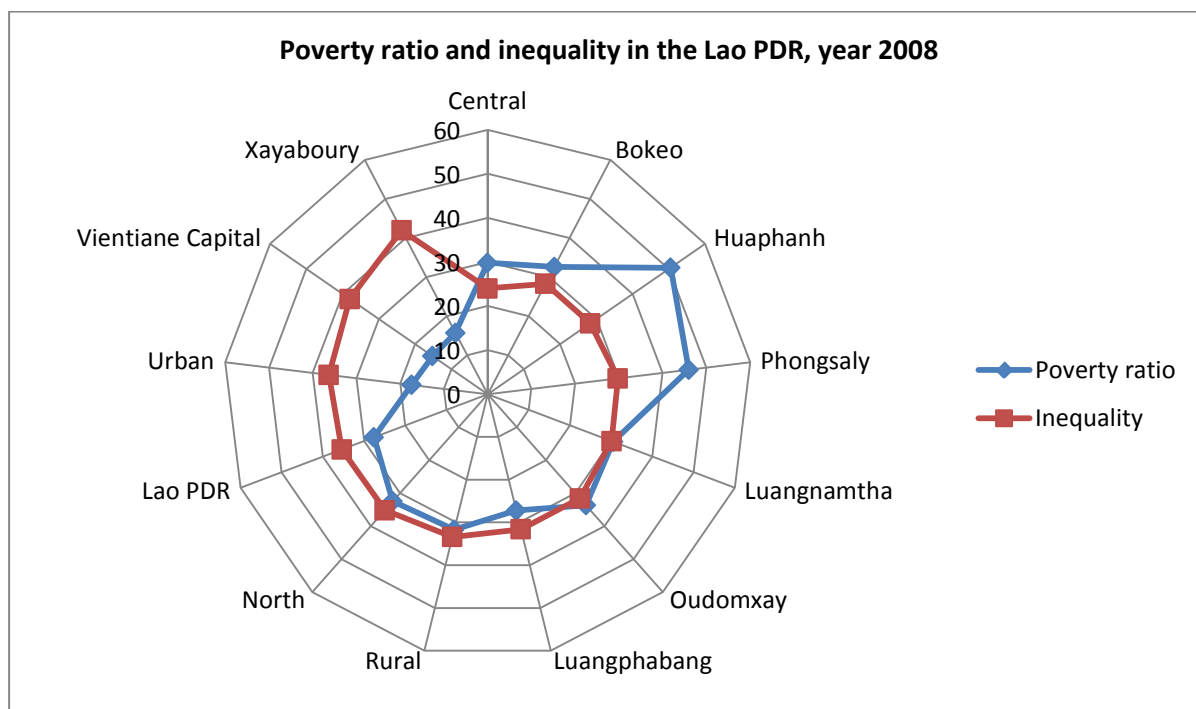


Figure 5.10. Poverty ratio and inequality in the Lao PDR in year 2008 (Ministry of Planning and Investment, 2011).

In Fig. 5.11 we present a visualization of poverty intensity and average household consumption per month in the Lao PDR in 2008.

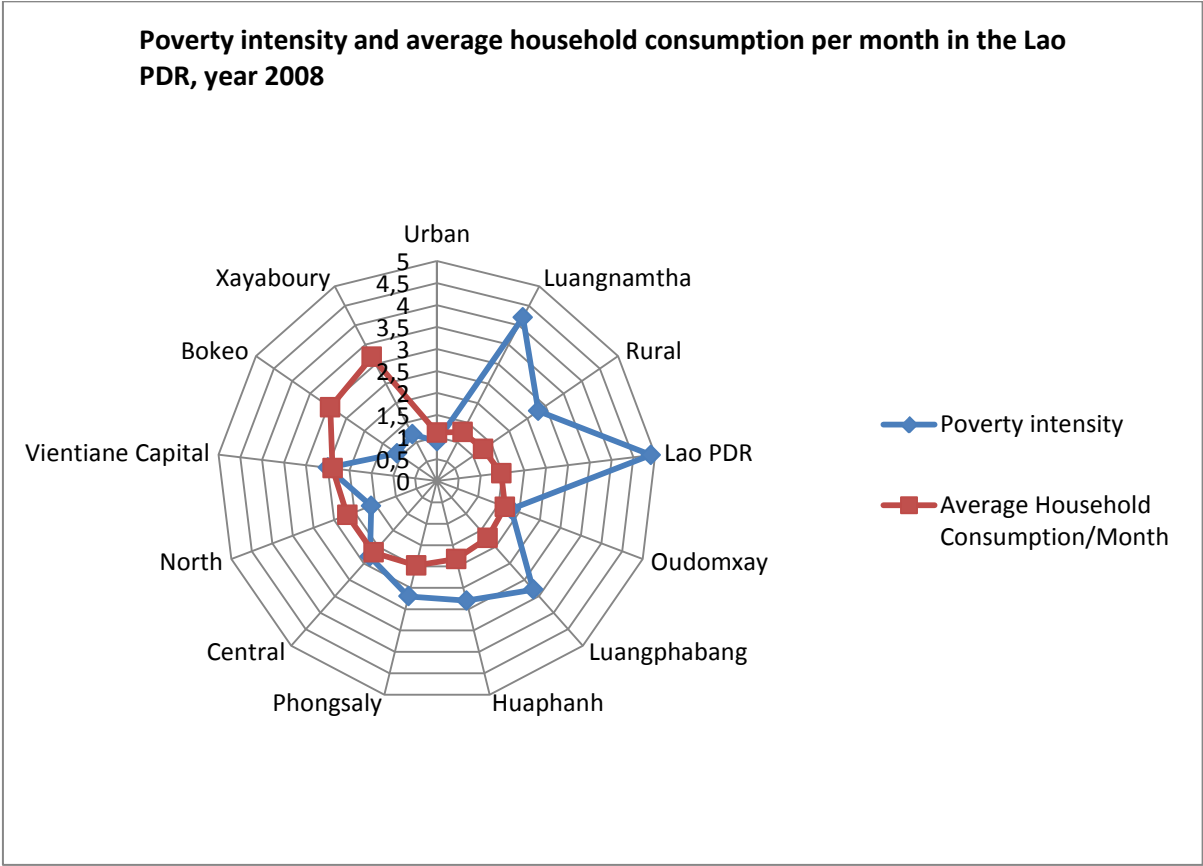


Figure 5.11. Poverty intensity and average household consumption per month in the Lao PDER in 2008 (Ministry of Planning and Investment, 2011).

In Fig. 5.12 we present a visualization of poverty gap and poverty ratio in the Lao PDR in 2008.

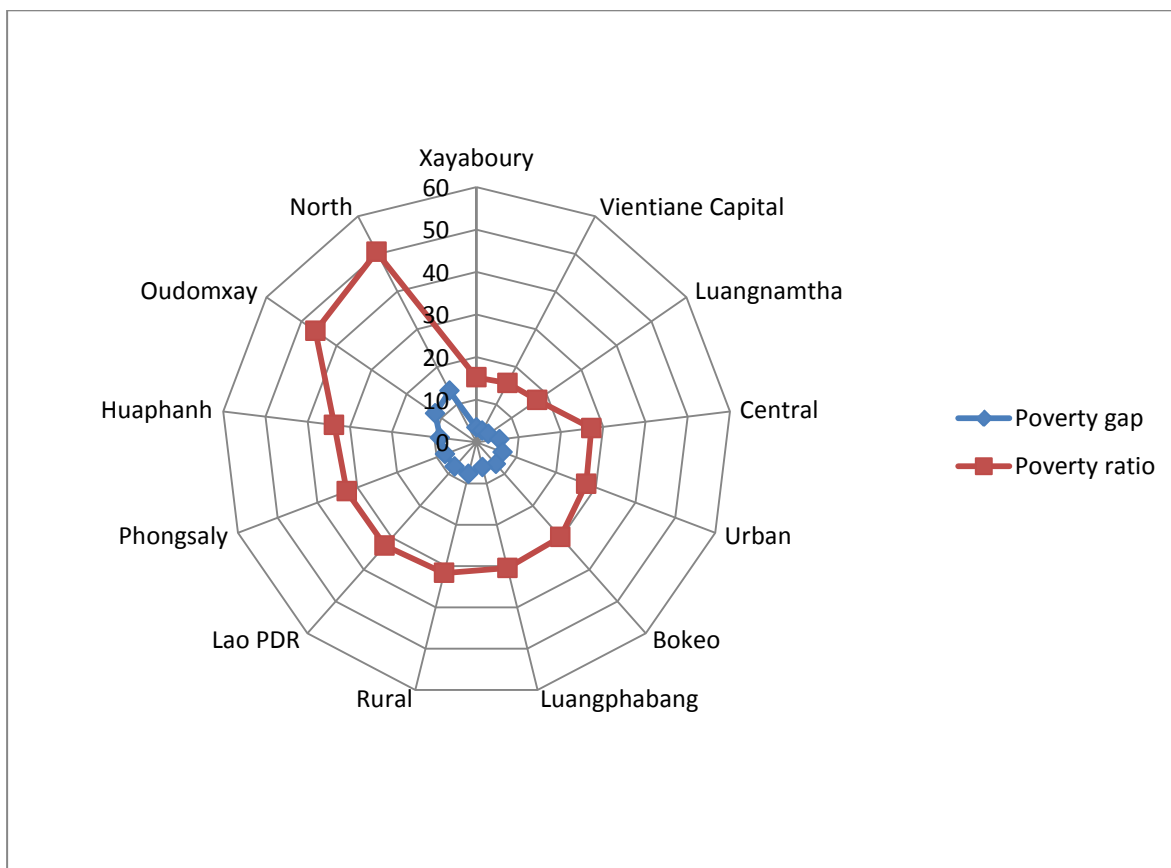


Figure 5.12. Poverty gap and poverty ratio in the Lao PDR in 2008 (Ministry of Planning and Investment, 2011).

As a summary we can present a summary of the empirical results. In order to make a comparative regional analysis in the Lao PDR, we calculated weighted poverty indicator using 5 key poverty indicators. Each indicator has weight of 0,20. The biggest number indicates to the biggest poverty related problems in a region.

We can call this indicator “Putting the Last to the First” –indicator (PLF-indicator). So if donors want to make some evaluations in relation to the severity of poverty problems in the provinces or regions in Lao PDR, this PLF-indicator is one comprehensive poverty indicator to consider (see Fig. 5.13).

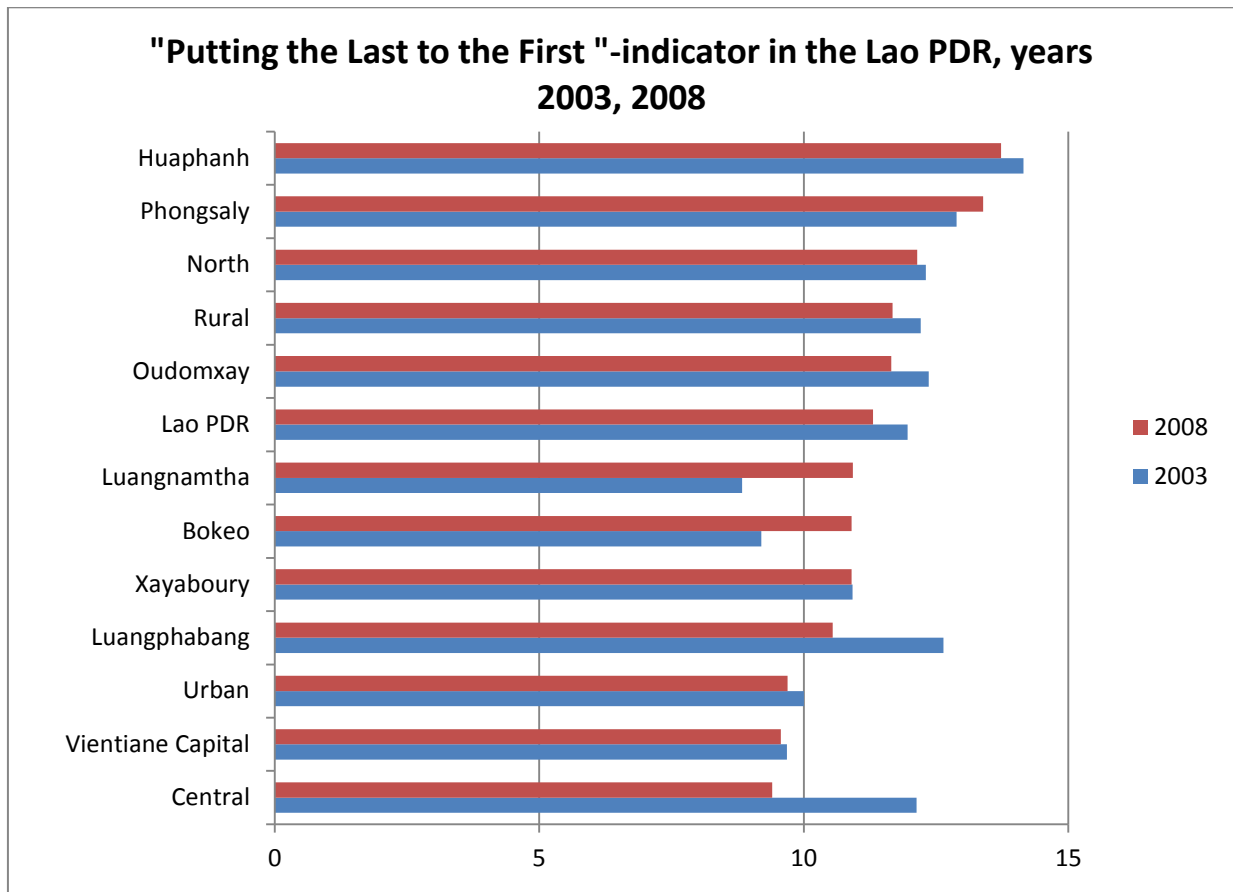


Figure 5.13. "Putting the Last to the First "-indicator in the Lao PDR, years 2003 and 2008. $PLF = -(0,2 \cdot C3) + (0,2 \cdot E3) - (0,2 \cdot G3) + (0,2 \cdot I3) + (0,2 \cdot K3)$, C3= Average consumption of household, E3=Poverty ratio, G3=Poverty gap, I3=Poverty intensity and K3=Inequality index. (Ministry of Planning and Investment, 2011)

One serious economic problem in Laos is inflation and raising consumer prices. It case also problems for poverty policy in the Lao PDR. Consumer prices started to increase more in late 1990s (see Fig. 5.14).

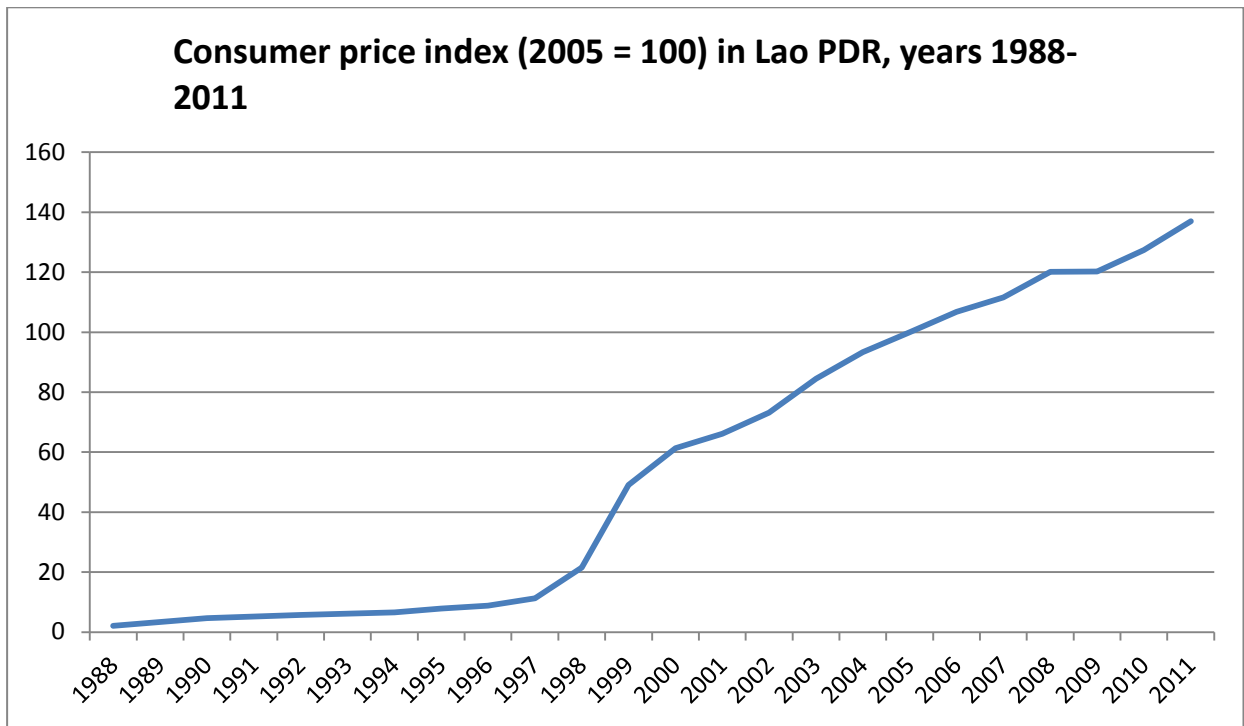


Figure 5.14. Consumer price index (CPI) in Laos, years 1988-2011 (World Bank 2013).

In 2011, according to CPI, consumer prices were about 7-fold higher they were in 1998. This means quite high inflation rate.

In Fig. 5.15, inflation rate development in (annual %) Laos is reported. In Laos there was super inflation period in years 1996-2000.

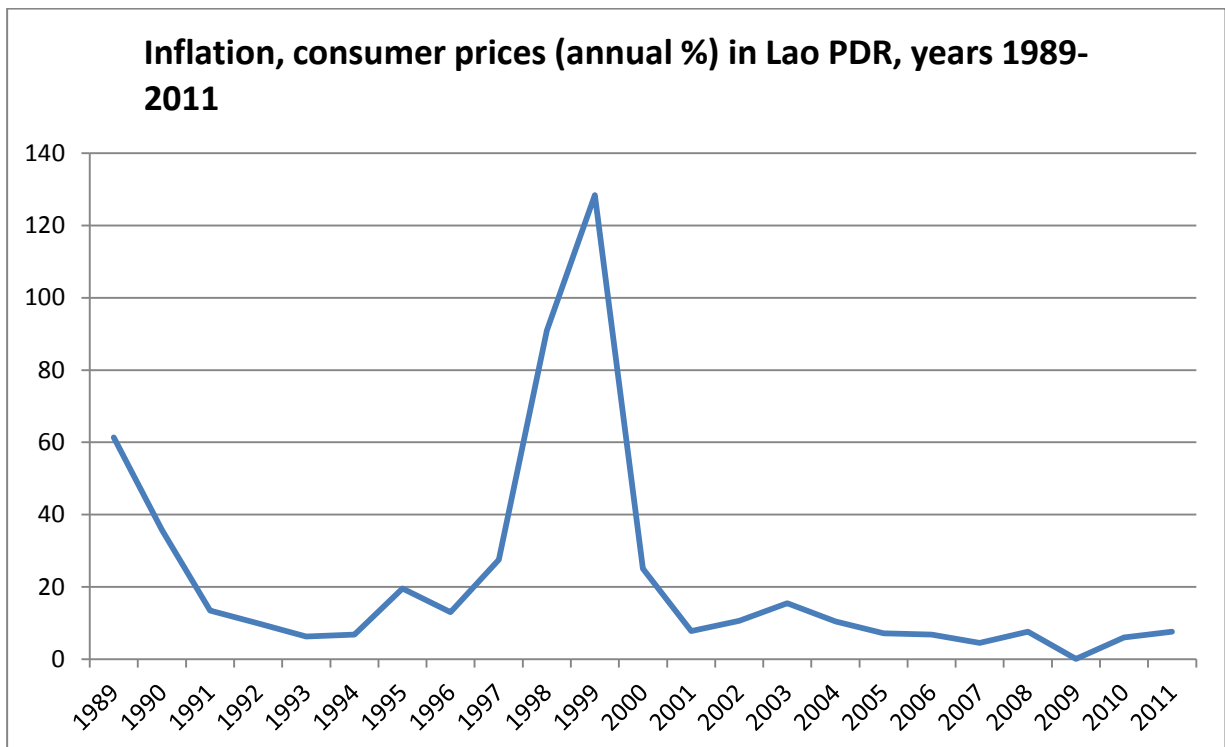


Figure 5.15. Inflation rate in the Lao PDR (World Bank 2013).

5.3. Backcasting Scenario Analyses

5.3.1. Government plans, revenues, grants and expenditures

Next, we can analyse backcasting scenarios on the basis of official targets of the 5-year plan. In Table 5.1 targets of the 7th Five-Year Socio-economic Development plan (2011-2015) are reported:

Table 5.1. Targets of the 7th Five-Year Socio-economic Development plan: Total population, GDP at current prices, GDP growth rate and the structure of GDP (2011-2015)

No.	Items	Targets
1	Total population in 2015 (1000 persons)	6,9
2	GDP (at current price) in 2015 (billion USD)	101.400
	GDP (at current price) in 2015 (million USD)	11,929
3	Economic growth rate	>8%
4	Structure of GDP, year 2015	
	Agriculture	3,5%
	Industry	15%
	Service	6,5%
5	Income per capita 14,5 (million kip)	14,4
	Income per capita (USD)	1,700
6	Trade sector	
	Export rate per year	18%
7	Banking sector	
	Inflation rate	<8%
	Exchange rate (kip/USD)	8,500 (+/-5%)
	Saving ratio to GDP	39,5
8	Financial sector	
	Revenue to GDP	19-21%
	Expenditure to GDP	22-25%
	Budget deficit to GDP	3-5%
	State savings to national revenue	2-5%

Table 5.2. Targets of the 7th Five-Year Socio-economic Development plan: Investment, Labour and employment and Social targets (2011-2015)

No.	Items	Targets
9	Investment	
	Total investment to GDP	101.400
	Investment ratio to GDP	11,929
	PIP	>8%
	Grants and loans	24-26%
	Internal and external investments of private sector	50-56%
	Credit loans and social investment	10-12%
	Public investment budget allocation	
	Investment in economic sector	30%
	Investment in social sectors	35%
	Investment in infrastructural construction (roads and buildings)	35%
10	Labour and employment	
	Available labour force (million persons)	3,26
	Labour supply (million persons)	3,17
	Share of labour in agricultural sector	70%
	Share of labour in industrial sector	7%
	Share of labour in service sector	23%
11	Social targets	
	Life expectancy	67 years
	Men	66 years
	Women	68 years
	Poverty ratio	19%
	Prevalence of underweight children who aged under 5	22%
	Proportion of poor households with access to electrification to total households	80%

The highest priorities of the socio-economic development strategy to 2020 of the Government of Laos (GoL) are addressing poverty, improving the living standards of the population through economic growth based on the sustainable use of the country's natural resource base.

Next we present some futures oriented portfolio analyses. We use as a starting point 5-Year document and extent these analyses till year 2020.

In Table 5.3 we are reporting government revenues and grants as percentage shares of GDP for 2004-2012 (Menon & Warr 2013, 9).

Table 5.3. Government revenues and grants as percentage shares of GDP in Laos, years 2004-2012.

Items	2004	2005	2006	2007	2008	2009	2010	2011	2012
Resource revenue	11	11,8	12,4	14	15,9	17,1	18,6	18,4	19,4
Resource revenue	0,3	0,8	2	2,7	3,3	2,9	2,6	3,7	4,8
Mining revenue	0,1	0,5	1,7	2,4	2,6	2,1	1,8	2,9	3,8
Hydropower revenue	0,1	0,3	0,3	0,3	0,7	0,8	0,8	0,8	1
Profit taxes	0,9	1,1	1,3	2,4	3	2,8	2,1	2,6	3,7
Of which: Mining and hydro	0	0,2	0,3	1,3	1,8	1,4	0,9	1,6	2,8
Of which: Non mining and hydro	0,9	0,9	1	1	1,2	1,4	1,2	1	0,9
VAT	2,3	2,3	2,6	2,7	2,7	3	3,6	3,8	3,8
Excise duties	1,9	1,8	2,3	2,6	2,7	3	3,2	3	2,9
Import duties	1,4	1,5	1,5	1,5	1,5	1,5	1,6	1,5	1,4
Royalties	1,1	1,2	1,3	1,4	0,8	0,6	1,1	1,2	1,4
Of which: Mining	0	0,1	0,6	0,7	0,7	0,5	0,8	0,8	0,9
Of which: Hydropower	0,1	0,2	0,2	0,1	0,1	0,2	0,2	0,3	0,3
Other taxes	0,9	1,1	0,9	1	1,1	1,3	1,8	1,6	1,6
Nontax revenue	1,9	2	1,8	1,9	1,8	1,7	2	2	1,9
Dividends: Mining and hydro	0	0,1	0,8	0,5	0,5	0,4	0,4	0,4	0,4
Grants	1,1	1,7	2	1,7	1,6	2,3	2,4	1,9	1,7
Total Revenue and grants	12,1	13,6	14,5	15,8	17,5	19,4	21	20,3	21,1

In Table 5.4 we report government expenditure as percentage of GDP. Expenditure portfolio allocations are presented in US dollars (Menon & Warr 2013, 10).

Table 5.4. Government expenditures as percentage shares of GDP in Laos, years 2004-2008.

	2002	2003	2004	2005	2006	2007	2008
National Defence	1,83	2,45	2,43	2,34	2,07	1,78	1,58
Security	0,73	0,62	0,63	0,73	0,64	0,55	0,49
Ministry of Foreign Affairs	0,41	0,43	0,35	0,36	0,33	0,32	0,34
Justice	0,06	0,05	0,06	0,05	0,05	0,04	0,05
Planning and Investment	0,1	0,1	0,06	0,09	0	0,06	0,19
Finance	3,96	3,3	3,71	3,89	0,29	0,41	1,13
Agriculture and Forestry	2,31	2,57	1,16	0	1,44	0,95	1,09
Communication, Transport, Post and Construction	3,24	4,97	3,43	0,09	4,68	4,06	2,86
Energy and Mines	0	0	0	0,25	0	0,31	0,58
Industry and Handicraft	0,38	0,47	0,22	0,38	0,09	0	0
Commerce	0,07	0,07	0,04	0,52	0,09	0,12	0,09
Information and Culture	0,5	0,4	0,25	2,22	0,11	0,46	0,57
Labor and Social Welfare	0,68	0,83	0,54	1,11	0,49	0,55	0,63
Education	2,18	2,2	1,86	1,22	3,1	3,05	2,47
Health	1,02	1,29	0,73	7,89	0,68	0,6	0,68
Total of Organizations and Provincial Administration	2,87	2,21	1,45	10,43	4,55	4,81	6,66
All sectors, current	7,25	7,42	7,47	7,89	8,95	9,31	9,97
All sectors, capital	13,09	14,56	9,46	10,43	9,66	8,78	8,44
Total	20,34	21,98	16,93	18,33	18,61	18,08	18,41

5.3.2. Financial backcasting analysis with future portfolio analyses

In Fig. 5.16 we figure out the development of GDP in Lao PDR according to the World Bank Country Database (World Bank, 2014) and a backcasting scenario line based on 8 percent growth rate, which is target growth rate in the FiveYear plan for years 2010-2015.

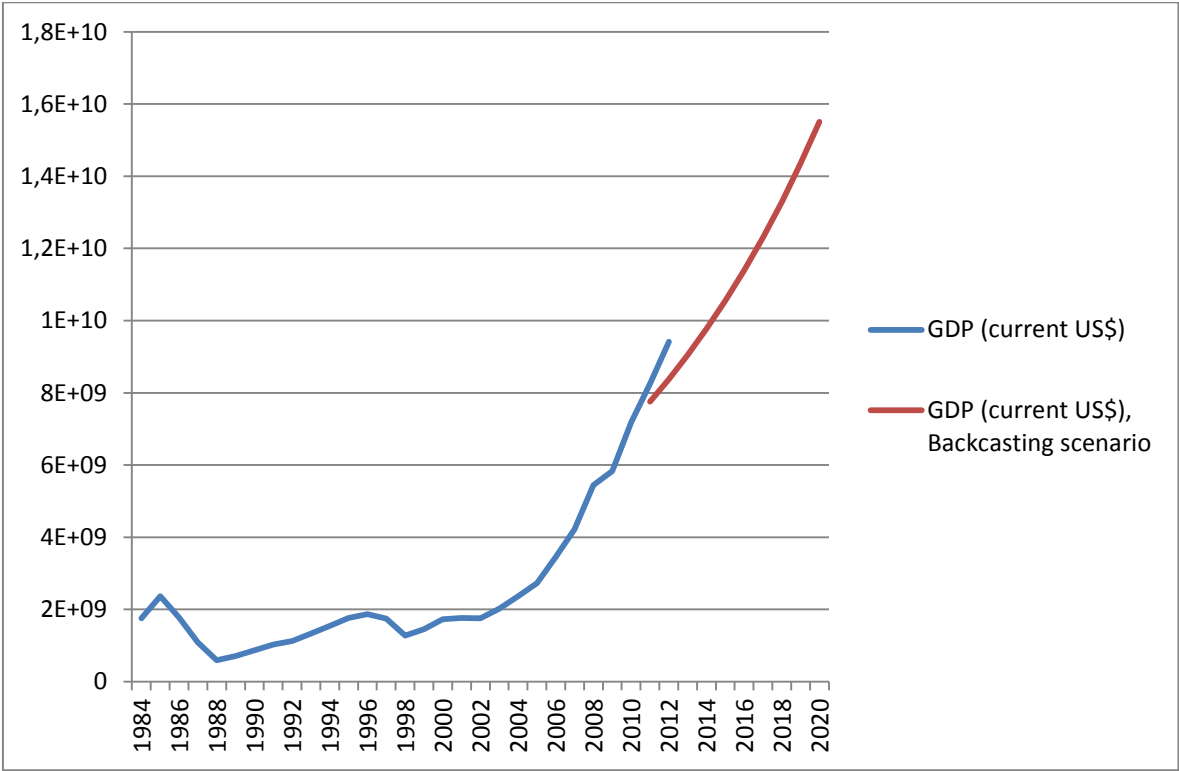


Figure 5.16. Historical GDP (current \$) and backcasting scenario (8% annual growth path) in the Lao PDR.

On the basis of scenario calculations based on 5-Year plan target of Gross National Growth, we present a Table 5.5 of government revenue and grants (USD), which is based on the backcasting scenario analysis. The scenario calculation is based on assumption that government shares are median values of the statistical observation in 2004-2012 and growth rate has been 8 percent per year.

Table 5.5. Government revenue and grants (current USD) in Lao PDR in 2020, based on backcasting scenario (Billion current US\$) (8% growth of GDP) and minimum, median and maximum budget allocation of items in 2002-2008.

	Min	Median	Max
Resource revenue	1,70546E+02	2,46517E+02	3,00781E+02
Resource revenue	4,65126E+00	4,18613E+01	7,44201E+01
Mining revenue	1,55042E+00	3,25588E+01	5,89159E+01
Hydropower revenue	1,55042E+00	1,08529E+01	1,55042E+01
Profit taxes	1,39538E+01	3,72101E+01	5,73655E+01
Of which: Mining and hydro	0,00000E+00	2,01555E+01	4,34117E+01
Of which: Non mining and hydro	1,39538E+01	1,55042E+01	2,17059E+01
VAT	3,56596E+01	4,18613E+01	5,89159E+01
Excise duties	2,79075E+01	4,18613E+01	4,96134E+01
Import duties	2,17059E+01	2,32563E+01	2,48067E+01
Royalties	9,30252E+00	1,86050E+01	2,17059E+01
Of which: Mining	0,00000E+00	1,08529E+01	1,39538E+01
Of which: Hydropower	1,55042E+00	3,10084E+00	4,65126E+00
Other taxes	1,39538E+01	1,70546E+01	2,79075E+01
Nontax revenue	2,63571E+01	2,94580E+01	3,10084E+01
Dividends: Mining and hydro	0,00000E+00	6,20168E+00	1,24034E+01
Grants	1,70546E+01	2,63571E+01	3,72101E+01
Total Revenue and grants	1,87601E+02	2,71323E+02	3,27138E+02

In Fig.5.17 we have reported minimum, median and maximum shares of government revenue and grants in the Lao PDR in 2004-2012.

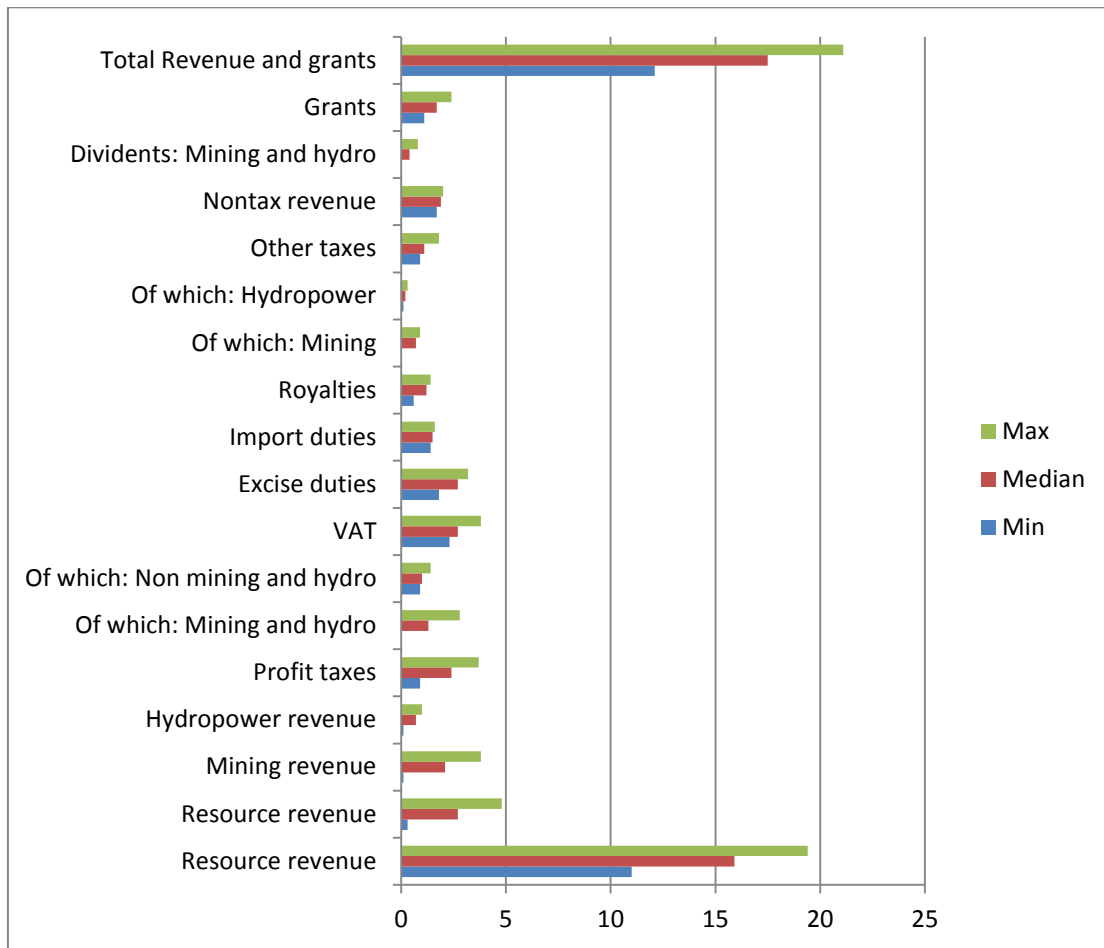


Figure 5.17. Minimum, median and maximum shares of government revenue and grants in the Lao PDR in 2004-2012.

On the basis of scenario calculations based on 5-Year plan target of Gross National Growth, we present a Table 5.6 of government expenditures (USD), which is based on the backcasting scenario analysis. The scenario calculation is based on assumption that government shares are median values of the statistical observation in 2004-2012 and growth rate has been 8 percent per year since 2010 as targeted in the national plan.

Table 5.6. Government expenditure (USD) in Lao PDR in 2020 based on backcasting scenario (Billion current US\$) (8% growth of GDP) and minimum, median and maximum allocation of items in 2002-2008.

	Min	Median	Max
Resource revenue	3,20937E+01	3,76752E+01	3,62798E+01
Resource revenue	9,76764E+00	1,13181E+01	1,13181E+01
Mining revenue	5,34895E+00	5,58151E+00	5,58151E+00
Hydropower revenue	7,75210E-01	9,30252E-01	7,75210E-01
Profit taxes	1,16281E+00	2,94580E+00	2,94580E+00
Of which: Mining and hydro	3,43418E+01	6,03113E+01	6,03113E+01
Of which: Non mining and hydro	1,74422E+01	2,23260E+01	2,23260E+01
VAT	5,31794E+01	7,25596E+01	7,25596E+01
Excise duties	1,93802E+00	8,99243E+00	8,99243E+00
Import duties	2,40315E+00	5,89159E+00	5,89159E+00
Royalties	1,39538E+00	8,06218E+00	8,06218E+00
Of which: Mining	7,13193E+00	3,44193E+01	3,44193E+01
Of which: Hydropower	9,14747E+00	1,72097E+01	1,72097E+01
Other taxes	3,62023E+01	4,80630E+01	4,80630E+01
Nontax revenue	1,09305E+01	1,22328E+02	1,22328E+02
Dividends: Mining and hydro	7,25596E+01	1,61709E+02	1,61709E+02
Grants	1,30545E+02	1,54577E+02	1,54577E+02
Total Revenue and grants	1,48220E+02	1,61709E+02	1,61709E+02

In Fig.5.18 we have reported minimum, median and maximum shares of government expenditure in the Lao PDR in 2002-2008.

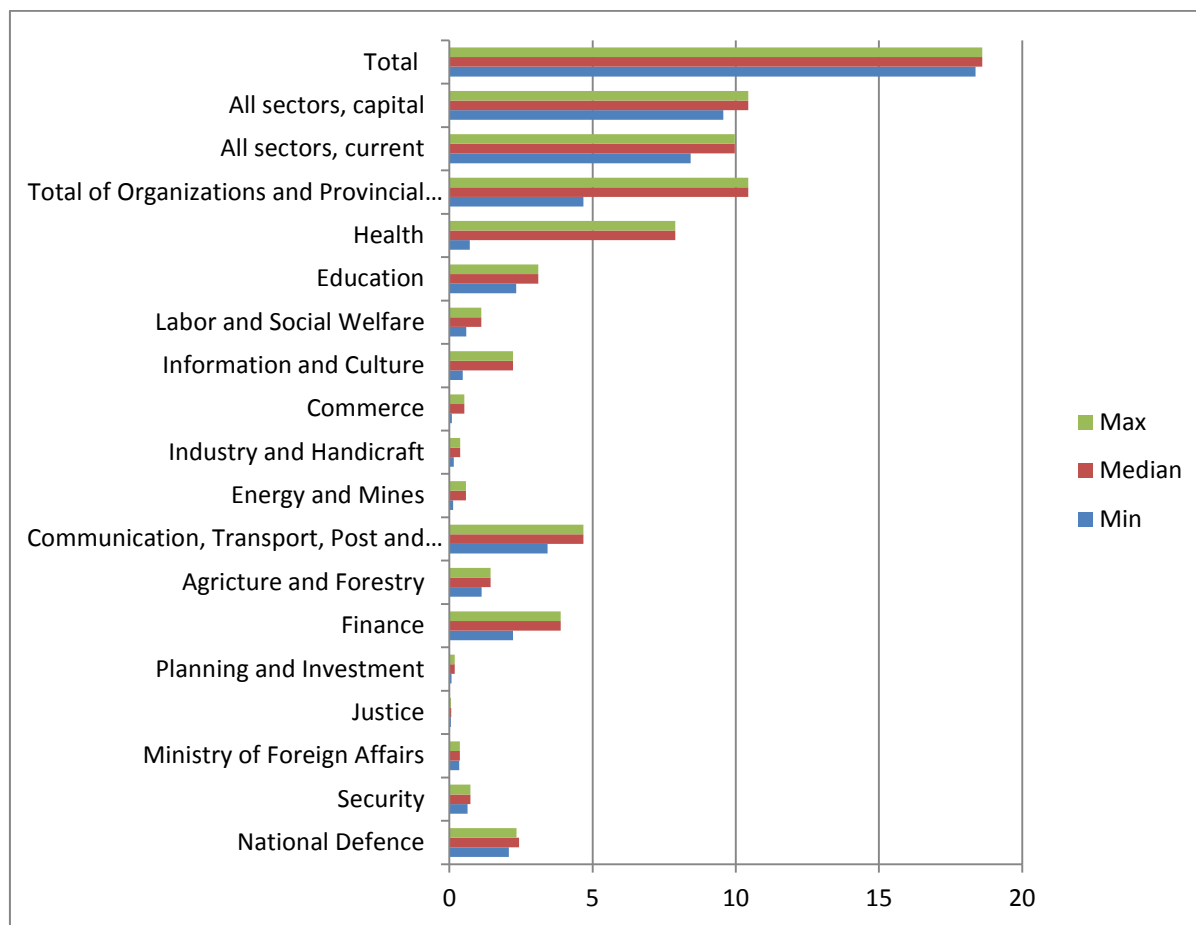


Figure 5.18. Minimum, median and maximum shares of government expenditure in the Lao PDR in 2002-2008.

In Figure 5.19 we have calculated investment portfolio development in 2010-2020 for the Lao PDR, based on some alternative GDP growth assumptions and assuming that the share of public investments portfolio is 11,929 % as defined in Table 5.2. above.

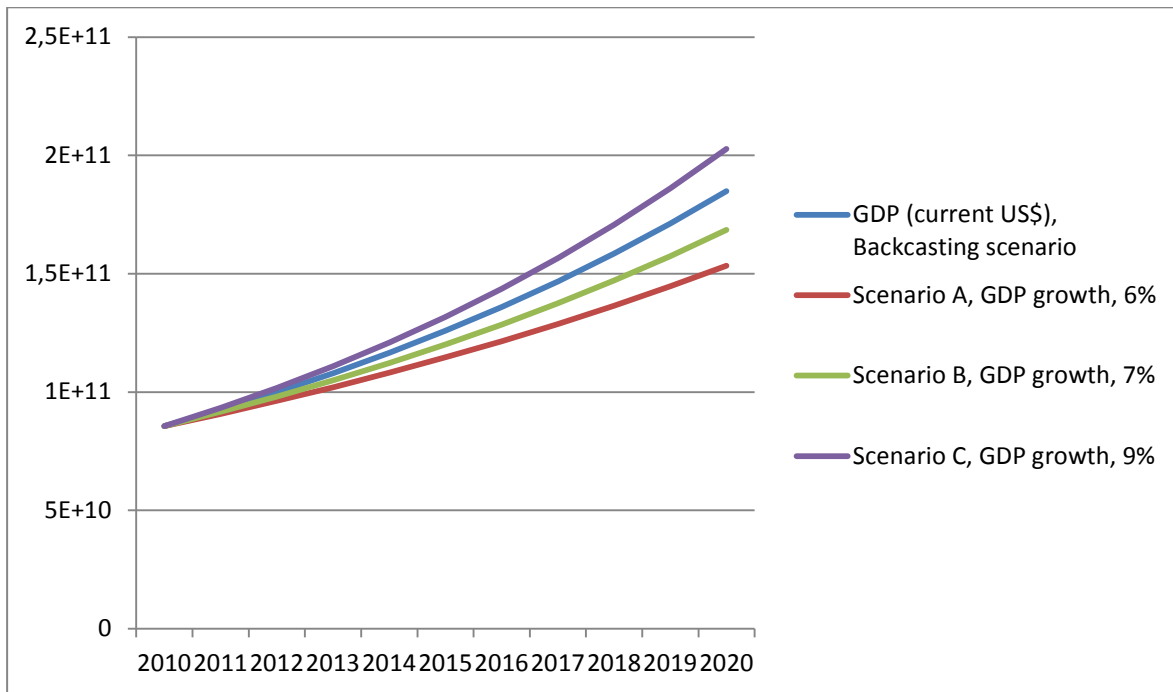


Figure 5.19. Public investment portfolio (current USD) in the Lao PDR, with alternative GDP growth assumptions, 6%, 7%, 8% and 9%. Key assumption public investment portfolio is 11,929% of the GDP.

Figure 5.20 presents Foreign direct investment portfolio (USD) in the Lao PDR, with alternative GDP growth assumptions, 6%, 7%, 8% and 9%. Key assumptions: (1) FDI portfolio in 32% of the GDP (share of FDI in 2010), (2) FDI portfolio is 25% of the GDP and (3) FDI portfolio is 40% of the GDP (top level in 1998).

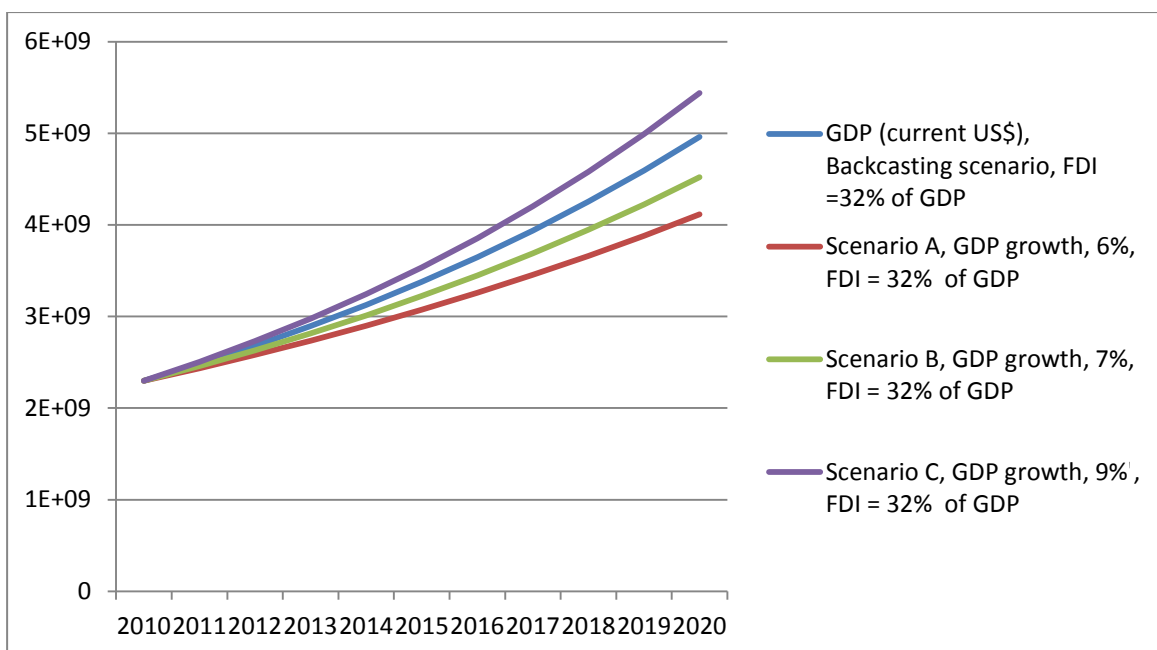


Figure 5.20. Foreign direct investment portfolio (current USD) in the Lao PDR, with alternative GDP growth assumptions, 6%, 7%, 8% and 9%. Key assumption is that the share of FDI of GDP is 32% of the GDP.

In Fig. 5.21 we have calculated scenarios with a *pessimistic assumption* that FDI of the Lao PDR is only 25% share of GDP.

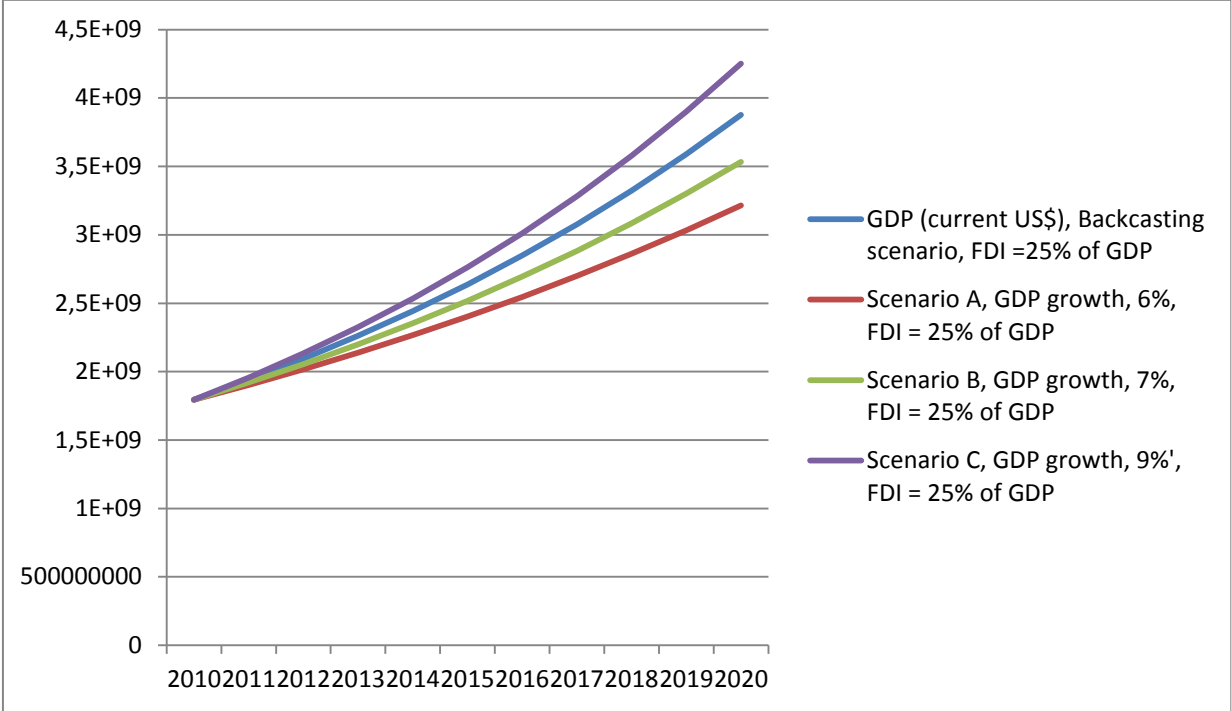


Figure 5.21. Foreign direct investment portfolio (current USD) in the Lao PDR, with alternative GDP growth assumptions, 6%, 7%, 8% and 9%. Key assumption is that the share of FDI of GDP is 25% of the GDP.

In Fig. 5.22 we have calculated scenarios with an *optimistic assumption* that FDI of the Lao PDR is very high, 40% share of the GDP.

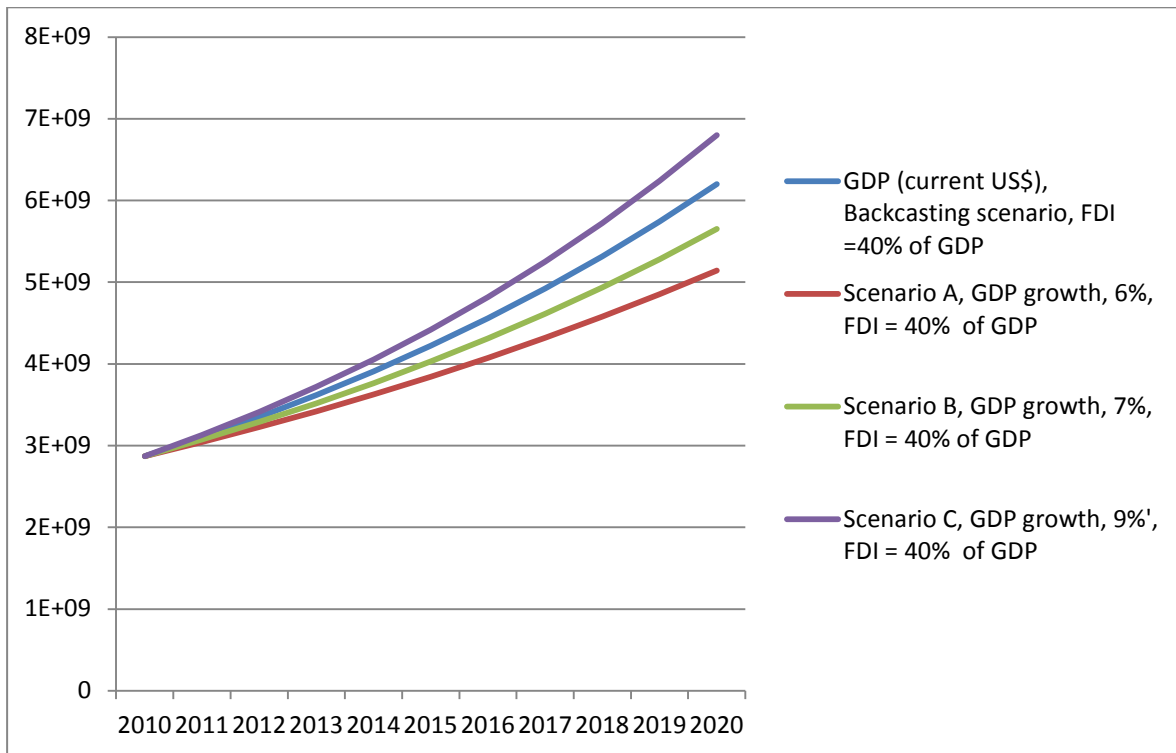


Figure 5.22. Foreign direct investment (FDI) portfolio (current USD) in the Lao PDR, with alternative GDP growth assumptions, 6%, 7%, 8% and 9%. Key assumption is that the share of FDI of GDP is 40% of the GDP.

In Fig. 5.23 we have figured out backcasting scenarios of resource revenue in the Lao PDR till 2020. There have been big variations in mining revenues, which explain big range of between minimum and maximum scenario paths. A very considerable revenue flow can be expected from natural resources in Laos.

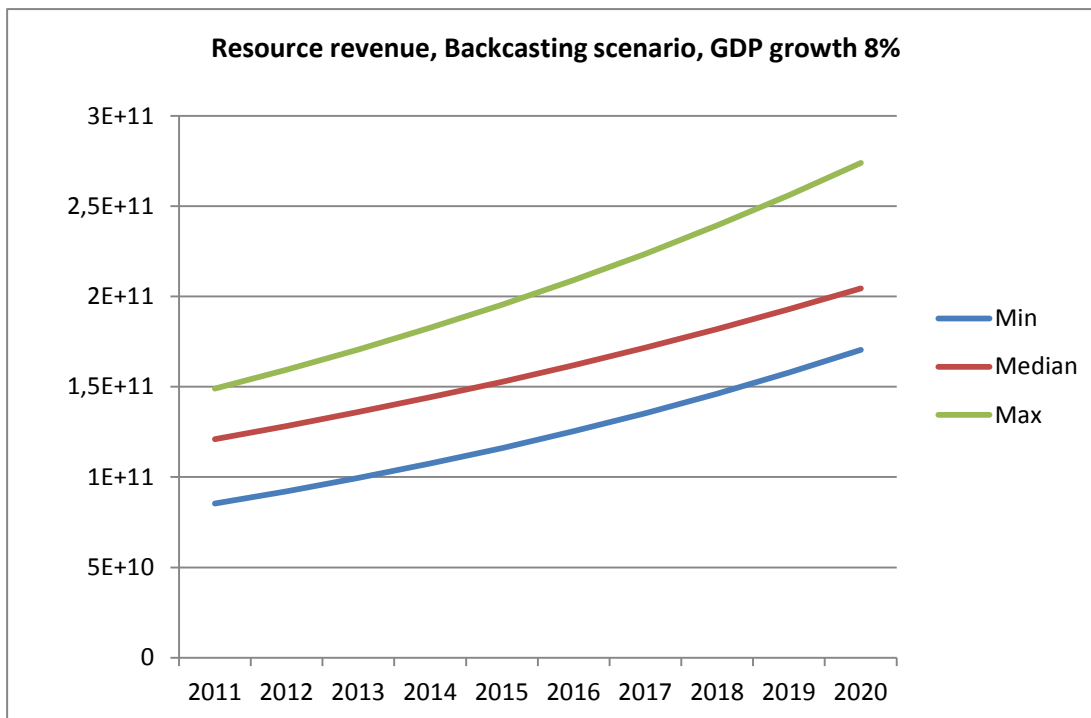


Figure 5.23. Resource revenue in Lao PDR: Backcasting scenario, GDP growth 8%. Min, Median and Max scenario paths.

In Fig. 5.24 we have figured out backcasting scenarios of mining revenue in the Lao PDR till 2020. A very considerable revenue flow can be expected from mining sector in Laos.

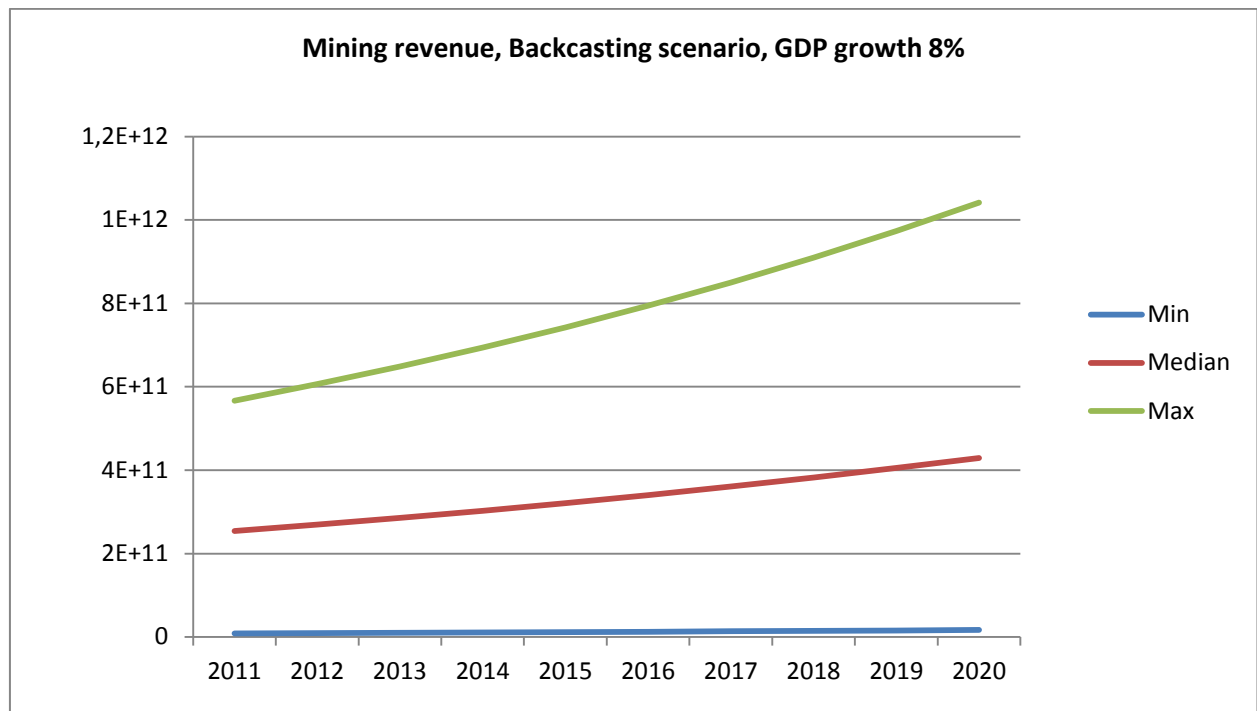


Figure 5.24. Mining revenue in Lao PDR: Backcasting scenario, GDP growth 8%, Min, Median and Max scenario paths.

In Fig. 5.25 we have figured out backcasting scenarios of royalties from mining sector in the Lao PDR till 2020. A very considerable revenue flow can be expected from thee royalties of the mining sector in Laos.

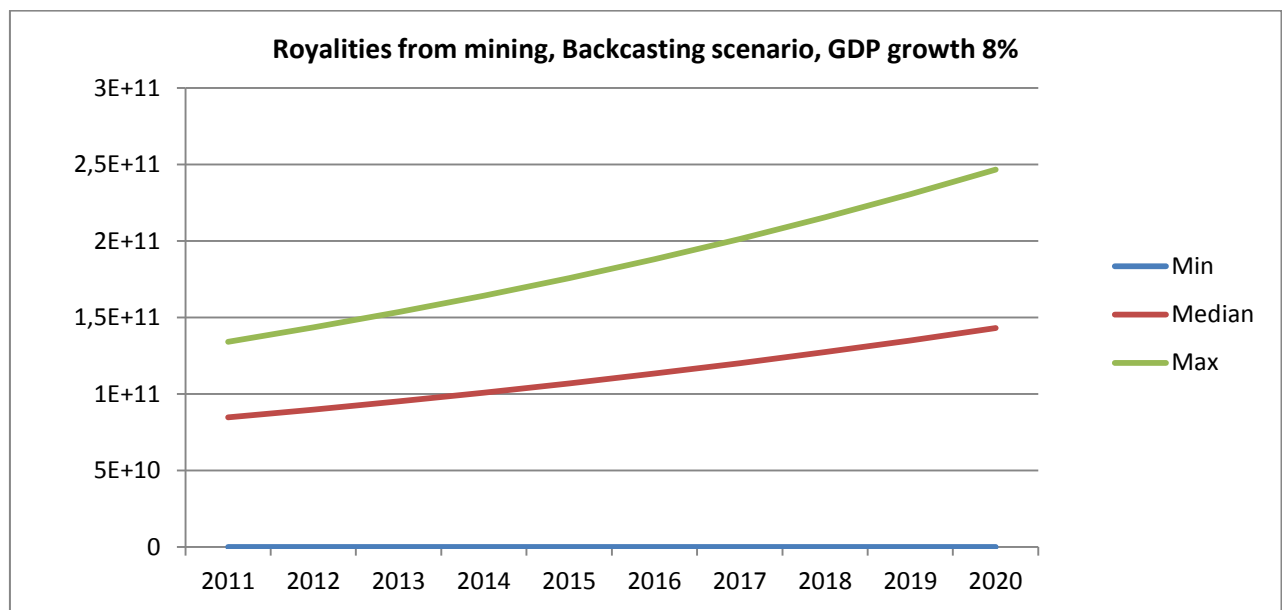


Figure 5.25. Royalties from mining in the Lao PDR: Backcasting scenario, GDP growth 8%, Min, Median and Max scenario paths.

In Fig. 5.26 we have figured out backcasting scenarios of profit taxes from mining and hydro power in the Lao PDR till 2020. Again, a very considerable revenue flow can be expected from profit taxes from mining and hydro power in Laos.

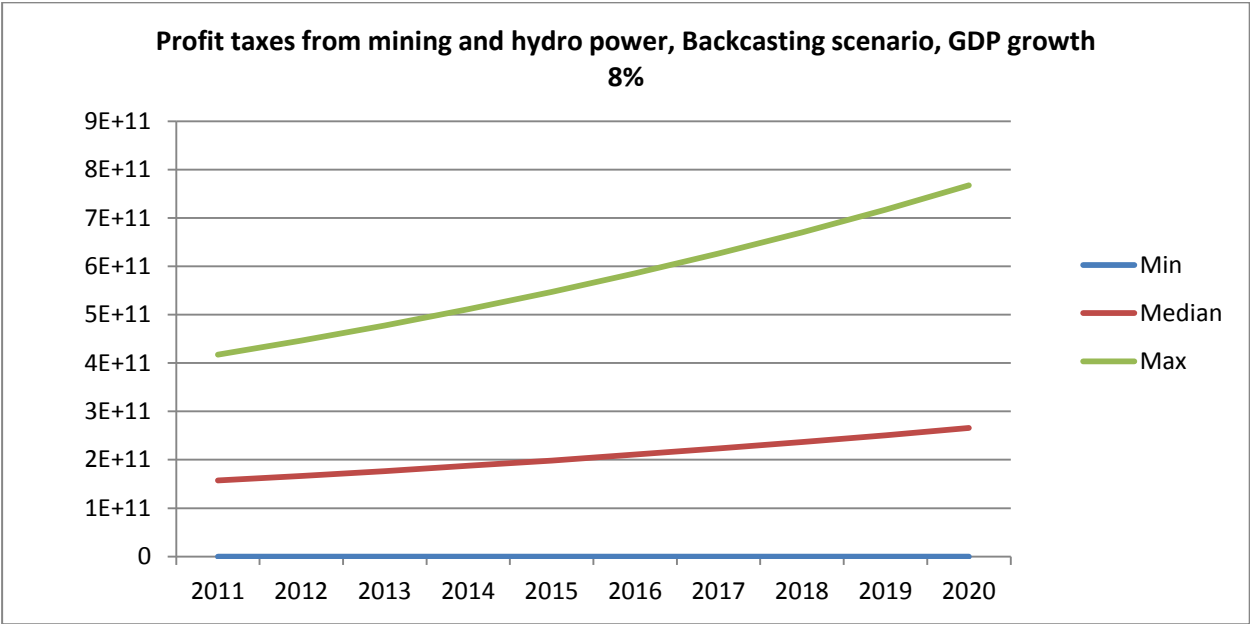


Figure 5.26. Profit taxes from mining and hydro power in Lao PDR: Backcasting scenario, GDP growth 8%, Min, Median and Max scenario paths.

5.3.3. Special targets of the mining sector and the hydroelectricity sector in the Lao PDR

In Laos, the main objectives in developing the mining sector are to (Kyophilvong 2008, 77):

1. Promote the sustainable use of national mineral resources and use mining effectively and to protect the environment and minimize the negative impact on the environment, society and biodiversity.
2. Make the mining sector an important revenue source for development, and to promote the mining industry to contribute to rural development and poverty eradication.
3. Build infrastructure for industrialization and the eradication of poverty by 2020.

The main tasks of the long-term development plans are as follows (Kyophilvong 2008, 77):

1. To promote the usage of natural minerals to maximize profits of production; and to promote high-technology survey systems in order to identify mining deposits, and quantity and quality of mines.
2. To promote large-scale investment in large core mining projects; and to collect data and information for building a middle-term mining development plan for medium and large projects.
3. To strengthen the capacity of state owned mining companies to be more profitable; and to strengthen the capacity of government institutions in mining activities, investment procedures, and revenue collection from the mining industry in an efficient and timely manner.

4. To build human resources in the mining sector in order to respond to demand: and to cooperate with the mining sectors in foreign countries to use advanced technology and experiences; and to build controlled environment systems in the mining sector.

In the Lao PDR, there are very clear goals, strategies and plans in the mining sector.

For energy sector, there are also some strategic goals and visions in the Lao PDR. The government of Lao PDR has identified the development of hydropower, which turns falling water into energy, as vital to the country's economic growth and poverty alleviation. The fast pace and large volume of hydropower development is changing the way water is used and is putting social and economic pressure on the environment and people's livelihoods. The Government of Lao PDR wants to follow best practice environmental and social standards in hydropower sector.

In the Lao PDR energy and mining sector is a strategic sector in both short and long term. Energy sector is aimed to serve the society and generate remarkable incomes to accumulate capital and other resources, to be expended on the country's socio-economic development and lift up standards of living. There are specific targets for both hydroelectricity and mining cluster.

Hydroelectricity: Targets for 2015

General target is to construct medium and large hydropower projects in the Northern, Central and the Southern parts to have enough electricity meet the domestic demand by the year 2012. During the planning period 2011-2015, complete construction of 8 power stations with an installed capacity of 2,862 MW which will be produce energy 15,321 GWH per year and construction of 10 additional projects adding up to 5,015 MW of hydropower and costing US\$ 11,295 million. The vision is that natural resources, including water and minerals, must be used effectively and to preserve and protect the environment. Development in the power sector is focussed on using, developing, and expanding hydro sources, coal and renewable energy in an environmentally friendly way. There is a special target to expanse electricity lines to meet these twin objectives of supplying electricity domestically for country's development, and export. (Ministry of Planning and Investment 2011, 126).

The expansion of electrical transmission line is a key issue in the electricity sector of the Lao PDR. Target is to expand medium voltage lines of 22 KV, and off-grid electricity to remote rural regions presently not having electricity, so that 80% of the total households across the country can use electricity by 2015. Another key target is to carry out integration of power grids between the Northern-Central and the Southern parts of the country, with the 115 KV transmission lines systems and strive to connect 500 KV transmission line systems with neighbouring countries, especially with Thailand and Vietnam. (Ministry of Planning and Investment 2011, 126).

Mining sector: Targets for 2015

The aim of mining development in Laos is to carry out geological and mineral surveys to do preliminary mapping and exploring of various minerals sites to assess their quantity and quality. This activity of mineral surveys will help assess the investment needs. Finances will be sought from international organisations to invest in the excavation and processing of minerals. Mineral milling facilities will also be created, with the ultimate aim to produce finished and semi-finished products, and phase out exporting raw minerals in the times to come. (Ministry of Planning and Investment 2011, 126).

The exploration and process of mine sector includes many activities. Key activity is to plot a geological-mineral map on the scale of 1/200,000; map 75% of the country's total area on a scale of at least 1/50,000. Another key activity is to manage to excavate some important mineral ores and process them into finished/semi-finished products before selling them, i.e. (1) lignite (13 million tonnes/year), (2) kali salt in Xaythany District (100 thousand tonnes/year and will be increase to 500 thousand tonnes/year), (3) explore and process kali salt at Nahong Village, Thakack District, Khammouane Province (sized 100 thousand tonnes per year) and (4) expect to explore more kali salt in Nongboke village. Moreover, there are plans to produce more (1) copper plates (86,200 tonnes per year), (2) gold bars (6 tonnes per year), (3) coal (728,000 tonnes/year), (4) copper dust (298,000 tonnes/year), and (5) gypsum (600,000 tonnes/year). (Ministry of Planning and Investment 2011, 126).

Very important target is to strive to complete constructing (1) a metal smelting plant in the North (Vang Vieng District), and (2) aluminium processing plant in the South, explore and process (3) gypsum in Khammouane and Savannakhet Provinces, explore (4) coal in Xiengkhoung Province, (5) small iron mining in Phongsaly, and probably other production units. (Ministry of Planning and Investment 2011, 126).

There are on-going programmes and many focussed projects: (1) Continue implementing the 22KV electrification project in six villages, Soukouma district, Champassack, costing 8.5 billion Kip from the government's budget and aimed to be complete by 2012; and (2) complete projects for which contracts have already been signed (PDA) and work is under construction, such as Nam Geum 3 (costing 8,916 billion Kip, to be completed before 2016) and implement 500KV electrification project in 10 Northern provinces costs 535.5 billion kip. Besides them, some mining projects are also prioritised, such as (3) Salaco Project (Bauxite) in Champassack province; (4) aluminium mining project in Attapeu province; (5) Phubia mining and (6) gold and copper mining at Sepon. (Ministry of Planning and Investment 2011, 127). All these projects and programmes require much resource and finance. Laos must mobilize funds for development. This means that the country must raise foreign grants and soft loans for efficient use in creating power-generating capacity and related infrastructure; invest in mineral exploitation where there is a big potential (maximising government benefits); and carry out fund-raising from all other economic sectors in the society. Laos needs to use new technology in conducting surveys, exploration and processing mine. In addition, the development of mining sector needs to be sustainable and proper social and environmental safeguard policies needs to be followed and developed. In this section we present one scenario analysis which is connected to important strategic problem in the Lao PDR. This scenario is based on field interviews and discus-

sions in the Ministry of Mining and Energy. In Fig. 5.27 we present three alternative strategies related to the mining sector and natural resource management.

Dynamic competences related to the mining sector and natural resource management

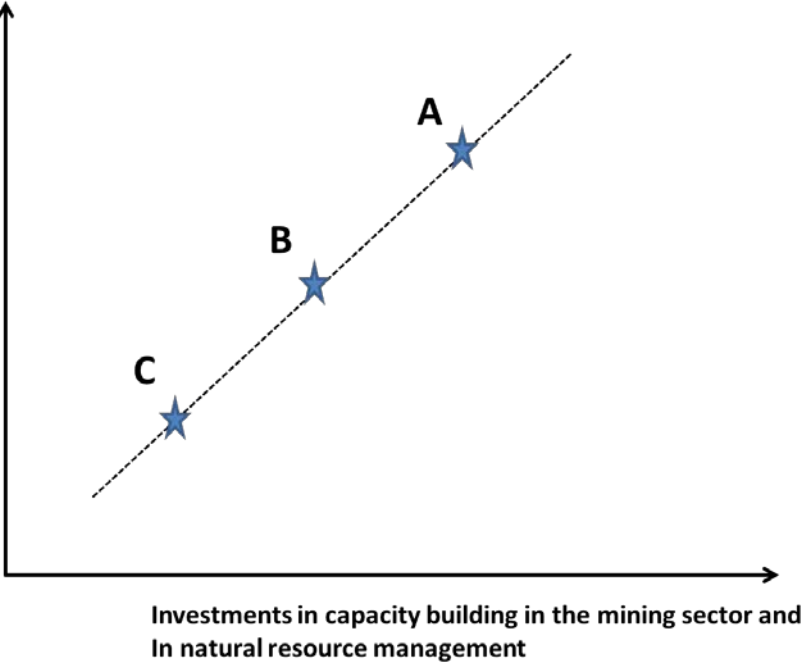


Figure 5.27. Investments in capacity building in the mining sector and in natural resource management and their impacts on dynamic competences in these fields.

In Fig. 5.28 we can present another scenario analysis linked to the first one above. This figure visualises how investments in capacity building have impacts on the value added to the economy and society. These kinds of strategic considerations are important when long-run policies for natural management and sustainability policy are discussed and planned in the Lao PDR.

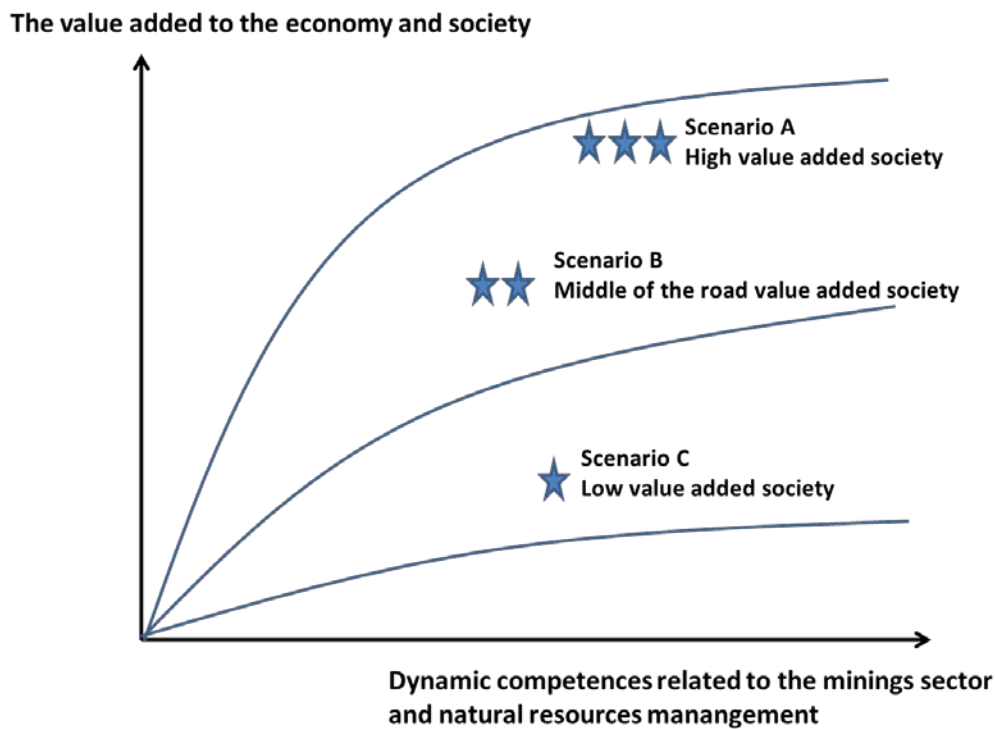


Figure 5.28. Impacts of dynamic competences on the value added to the economy and society in the long run.

Figure 5.28 visualised final results of capacity building policy in the Lao PDR. The bigger are capacity building investments, the better value-added we can expect to have in the future in Laos.

Laos needs to legalise mine exploration and processing activities, and encourage the sectors to observe regulations. To maximise benefits for the state of Lao PDR and people, the Government must use various measures against the law violators in the power minerals sector. The governance agencies of Laos must also ‘capitalise’ certain assets in the power and mineral sector for the state to maximise benefit from them. To provide transparent and well-functioning governance structures Laos must improve laws and regulations. This includes many improvements in policies, laws, regulations, coordination mechanisms and procedures. The scrutiny of documents by government officials will be faster and more transparent, to attract more investment in various sectors of governance. Agencies must elaborate strategic plans into programs and detailed projects to enable realisation. All energy and minerals utilisation includes, naturally challenges of environmental protection and human resource development. Using water sources, minerals and other natural resources effectively and economically requires planning of sustainability of the environment. There are also strong needs to enhance the human resource capacity (in both quality and quantity) especially in the field of mining. There are also needs to improve organisation of the energy and mining sector, and increase efficiency of all staff at all levels from centre to local levels for its personnel to make this sector grow rapidly. Special challenge is to give out mining concessions in a transparent manner following internationally set standards and maximize national benefits from them. (Ministry of Planning and Investment 2011, 127-128).

There are no exact goals and targets for the next planning period, 2016-2020, but probably similar issues are going to be on the political agenda of the Lao PDR. Strategic positioning, relevance, efficiency,

effectiveness and sustainability issues will need more public attention in Laos (see e.g. ADB 2010, iii-iv). Some strategic issues which are strategically challenging will be:

1. Import of petroleum products to Lao PDR,
 2. Power capacity and generation,
 3. Transmission and distribution,
 4. Power sales strategy,
 5. Reducing transmission and distribution losses,
 6. Deploying renewable energy techniques,
 7. Increasing demand side management measures,
 8. Managing accounts receivable,
 9. Managing the environmental and social implications of energy project,
 10. Updating environmental and social laws to meet sustainability requirements,
 11. Tariffs and financial performance; and
 12. Development of institutional links and capacity development to facilitate sustainable development.
- (ADB 2010, 8-10).

These issues will be probably highly relevant planning issues also before the year 2020. According to the ADB (2010), Nam Theun 2 project was a landmark from the perspective of commercial operations in Laos. Now there are 55 sites with a combined capacity estimated at over 16 000 MW. There are some challenging planning challenges such as (1) pacing hydropower development, (2) screening prospective hydropower developers, (3) negotiating hydropower agreements, (4) tendering of hydropower projects and (5) organizing power transmission from export-oriented independent projects (ADB 2010, 5-7). However, according to ADB: “The fact that there is no immediate market for an additional 16 000 MW of generating capacity in the Laos plus its GMS neighbours to at least 2020 suits the government’s perspective.” (ADB 2010, 6).

5.3.4. Backcasting analysis of the hydropower sector and the energy sector in the Lao PDR

In Fig. 5.29 we have illustrated backcasting scenarios of hydropower revenue in Lao PDR with an assumption of GDP growth of 8% (Min, Median and Max scenario paths).

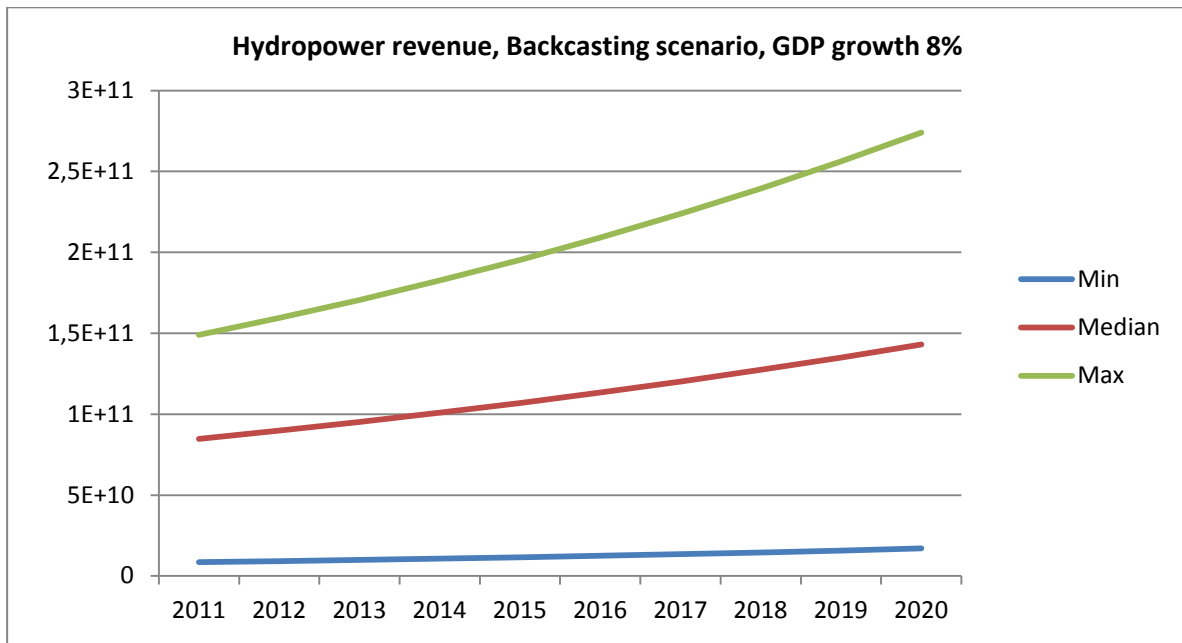


Figure 5.29. Hydropower revenue in Lao PDR: Backcasting scenario, GDP growth 8%, Min, Median and Max scenario paths.

Fig. 5.30 illustrates backcasting scenarios from royalties' from hydro sector. The expected royalty income is very considerable in Laos.

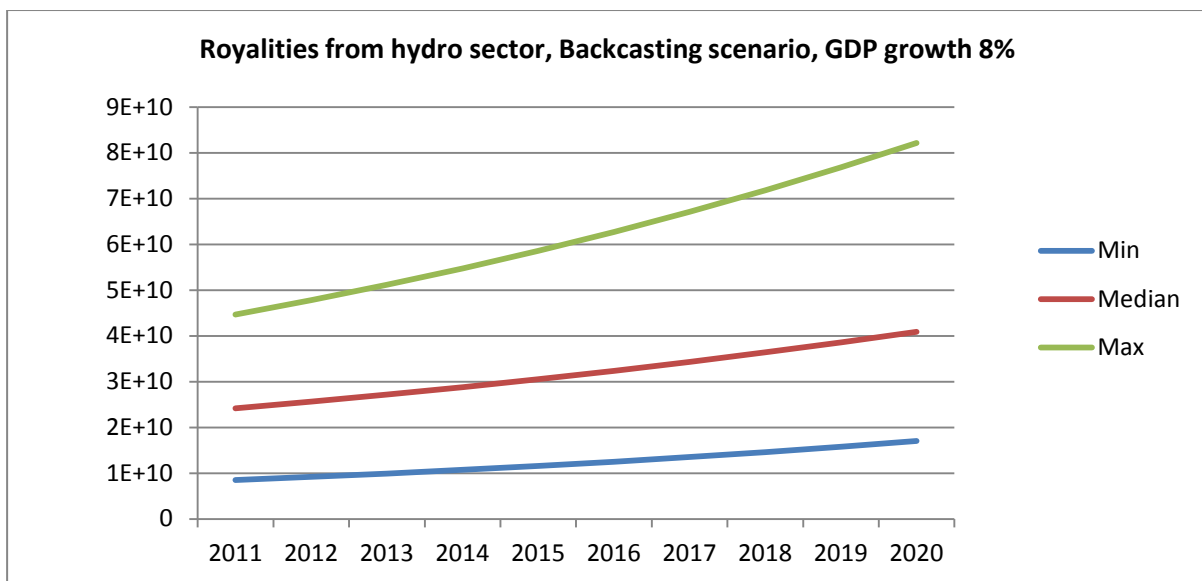


Figure 5.30. Royalties from hydro sector in Lao PDR: Backcasting scenario, GDP growth 8%, Min, Median and Max scenario paths.

These backcasting scenarios are anchored to the targets of 5-Year plan of Laos. Alternative scenario paths can be utilized in benchmarking and planning activities. There are considerable differences between minimum and maximum scenario paths. This indicates that there are a lot of uncertainties in planning of revenues and expenditures. Medium scenario paths are probably the most useful in benchmarking.

6. KEY LEARNINGS AND FINDINGS OF THE ADAPTIVE AND PARTICIPATORY FORESIGHT PROCESS

Adaptive foresight has been developed at the crossroads of foresight and adaptive strategic planning, so far focusing on technology and innovation policy. The key tenet of this paradigm is to consider whether certain strategic decisions should be deferred until more information is available and simultaneously whether to invest in (real) options which would facilitate the implementation of such decisions, should they be taken once in the future. As compared to conventional foresight approaches, adaptive foresight thus favours a more modest interpretation of the collective ability to “shape the future“ and stresses the need to adapt to the future as shaped by others. The adaptive planning paradigm provides a natural starting point for navigating the complex landscape of policy strategies. This is a reason, why this kind of flexible methodology is planned to be suitable in the project (Eriksson and Weber, 2006; 2008). In the FREPLA 2020 project methodology was tested in Lao PDR during series of workshops (5 workshops).

- FREPLA2020 Seminar/Workshop. Ministry of Energy and Mines (MEM) and Finland Futures Research Centre, 26–27 May 2011, Vientiane,
- High-level Seminar/Workshop of FREPLA2020. Ministry of Energy and Mines (MEM) and Finland Futures Research Centre, 27 August 2010, Vientiane,
- FREPLA2020 Project Expert Workshop III. Ministry of Energy and Mines (MEM) and Finland Futures Research Centre, 10–11 March 2010, Thakhek,
- FREPLA2020 Project Expert Workshop II. Ministry of Energy and Mines (MEM) and Finland Futures Research Centre, 29–30 September 2009, Luang Prabang, and
- FREPLA2020 Project Expert Workshop I. Ministry of Energy and Mines (MEM) and Finland Futures Research Centre, 3 June 2009, Vientiane.

FREPLA 2020 has focused on long-range planning challenges of Lao PDR in years 2008-2012. The key methodology of the FREPLA 2020-project has been Adaptive Foresight (AF) approach, which combines foresight and planning tools. To develop Adaptive Foresight approach it has been suggested that an exercise could be broken down into various successive or parallel phases, each of them fulfilling one or a few specific functions. This methodology includes in-built flexibility. Important phases are (1) diagnosis, (2) futures exploration, (3) strategic orientation, (4) making choices and (5) implementation and coordination. Adaptive Foresight includes basic elements of foresight: Diagnosis, Prognosis and Prescription/s. The AF includes more detailed guidelines for foresight and planning processes:

- Phase 1: Initial analysis and review
- Phase 2: Drafting exploratory framework of scenarios
- Phase 3: Specification of exploratory framework of scenarios
- Phase 4: Formulation of collective visions and objectives

- Phase 5: Identification of challenges associated with each framework scenario
- Phase 6: Identification of collective pathways (multiple backcasting)
- Phase 7: Identification of collective strategies (portfolio analysis)
- Phase 8: Identification of individual objectives, roles and options
- Phase 9: Identification of individual strategies (portfolios)
- Phase 10: Realisation and coordination.

These phases create Adaptive Foresight process. In "diagnosis phase", policy-makers and experts reflect on the situation of the current planning system and decision environment. In a fairly-open phase of "exploration" planners and experts build scenarios of possible future evolutions of the system with a wider participation of stakeholders. In a fairly-secluded phase of "strategic orientation" policy-makers discuss possible strategies on the basis of the diagnosis and of the exploration of the future carried out earlier possibly revealing their own hidden agendas "off record". In a largely-open phase of public debate decision-makers "make the fundamental choices" on the basis of a consensus as large as possible. In a phase of "implementation and coordination" the choices are transformed into policy.

This AF methodological approach includes a strong scenario thinking analyses linked to forecasting and backcasting analyses. The second key methodological element of the Adaptive Foresight is portfolio management thinking. Third methodological element is planning methods in general including interdisciplinary workshops. In the FREPLA2020 project five interactive workshops were organised on the basic logic of Adaptive Foresight methodology.

Typically there are various ways to manage sector projects in energy and natural resource planning. Often there are too many projects and it is easy to start up new ones. It is also typical that there is no systematic way to evaluate projects. People like also invest in "pet projects". For example, people want to implement new technologies for technology's and novelty's sake.

In large organisations there is not systematic and coherent ways to align projects with ministry's strategy. The end result is that planners cannot manage the totality of ministerial project portfolio. The Adaptive Foresight methodology is integrative methodology, which help project managers and planners to avoid the problems mentioned above. Adaptive Foresight methodology provides a solution for programme management problems. In the special case of Lao PDR this kind of approach has helped inter-ministerial communication and many administrative borders were made lower for more efficient planning and implementation. Especially, active projects and new project proposals are discussed more openly, more analytically and more critically, when the AF approach was used.

Which issues have been found to be important for the proper and working functions of Adaptive Foresight approach? Firstly, this approach includes logical concepts and phases of planning work. Unified concepts and consistent management model is an advantage of the AF methodology. Secondly, discussions about needed projects and project portfolios help ministries to plan more consistent plans for energy sector and natural resource management.

Project portfolio approach includes strong priority tools and ideas. Thirdly, portfolio management includes three key ideas: (1) the idea of manage project strategically, (2) the idea to manage the totality, and (3)

evaluate projects with some evaluation criteria. If planners follow these ideas, the quality of planning will increase and final results of the planning are better than without these key ideas of AF approach. In the case of Lao PDR these issues are relevant. There are still many needs for capacity building in the Lao PDR. For example, key concepts of sustainable development, integrated water resources management and associated management tools should be developed further in planning processes of the Lao PDR.

7. KEY ELEMENTS OF THE PORTFOLIO OF THE GOVERNMENT OF LAO PDR

Figure 7.1 shows aggregate government revenues as a share of GDP from fiscal years 2003–2004 to 2011–2012. Total government revenue has increased as a share of GDP from 12 to 21 per cent in only 8 years. Of this, revenues associated with mining and hydropower (direct revenues, profit taxes, royalties and dividends) have increased from 0.4 % to 9.2 % of GDP. When analysing the Government revenue and grants as percentage of GDP, the revenues derived from hydropower and mining play a significant role. Revenues from these sectors rose by 8.8 % of GDP.

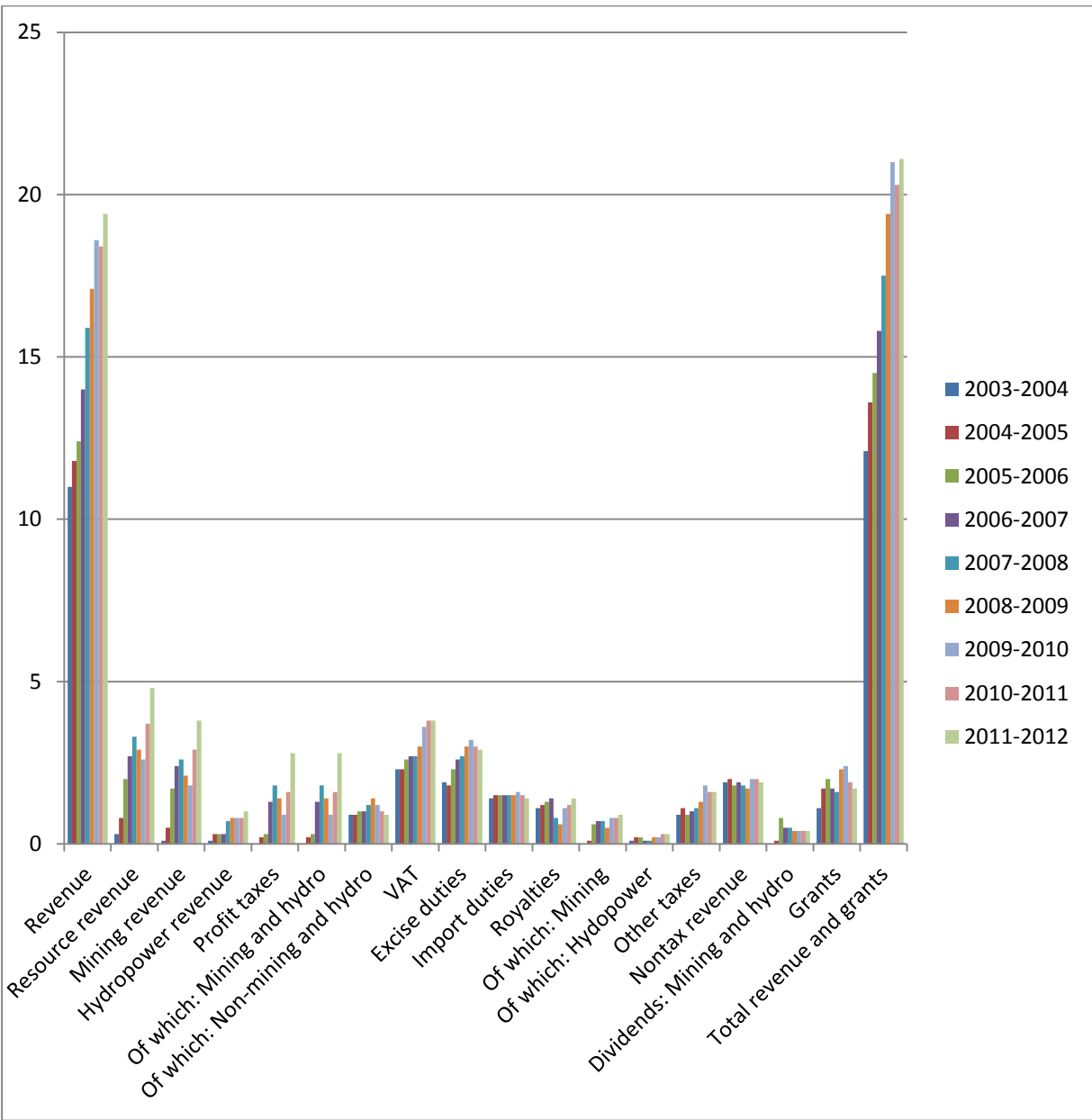


Figure 7.1. Government revenue and grants as percentage of GDP (Menon & Warr, 2013).

Figure 7.1 provides data on expenditures as a share of GDP from fiscal years 2001–2002 to 2007–2008, except that for the last 3 years, the defence and security data provided in the figure are estimated by Menon and Warr (2013). From the Fig. 7.1 it can be seen that the share of transport and finance sectors are the largest sectors that the Government of Lao PDR has financed.

As a share of GDP spending on agriculture has decreased from 2.3% to 1.1%, spending on health also has shrunk, from 1% to 0.7%, while spending on education has increased from 2.2% to 2.5%. The sum of these three crucial welfare-relevant categories declined from 5.5% to 4.3% of GDP.

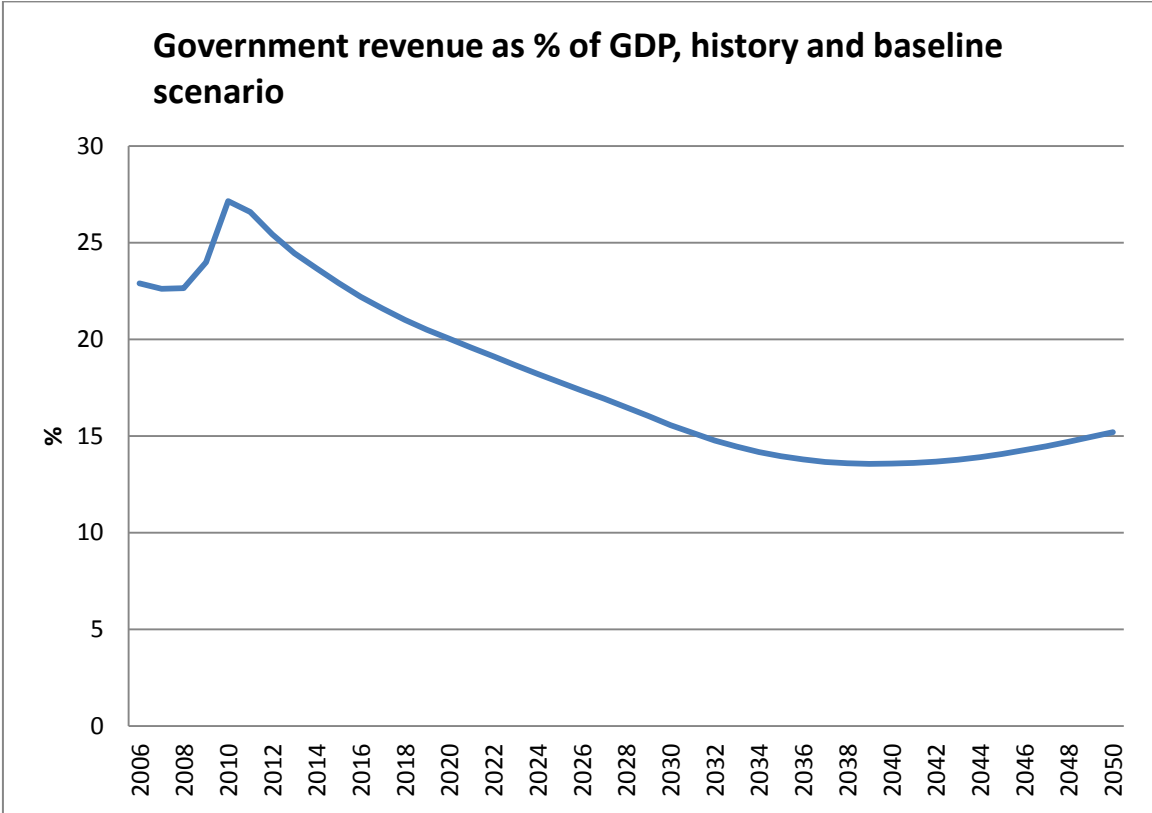


Figure 7.2. Government revenue as % of GDP, history and baseline scenario (IF Baseline Scenario, vers. 6.25).

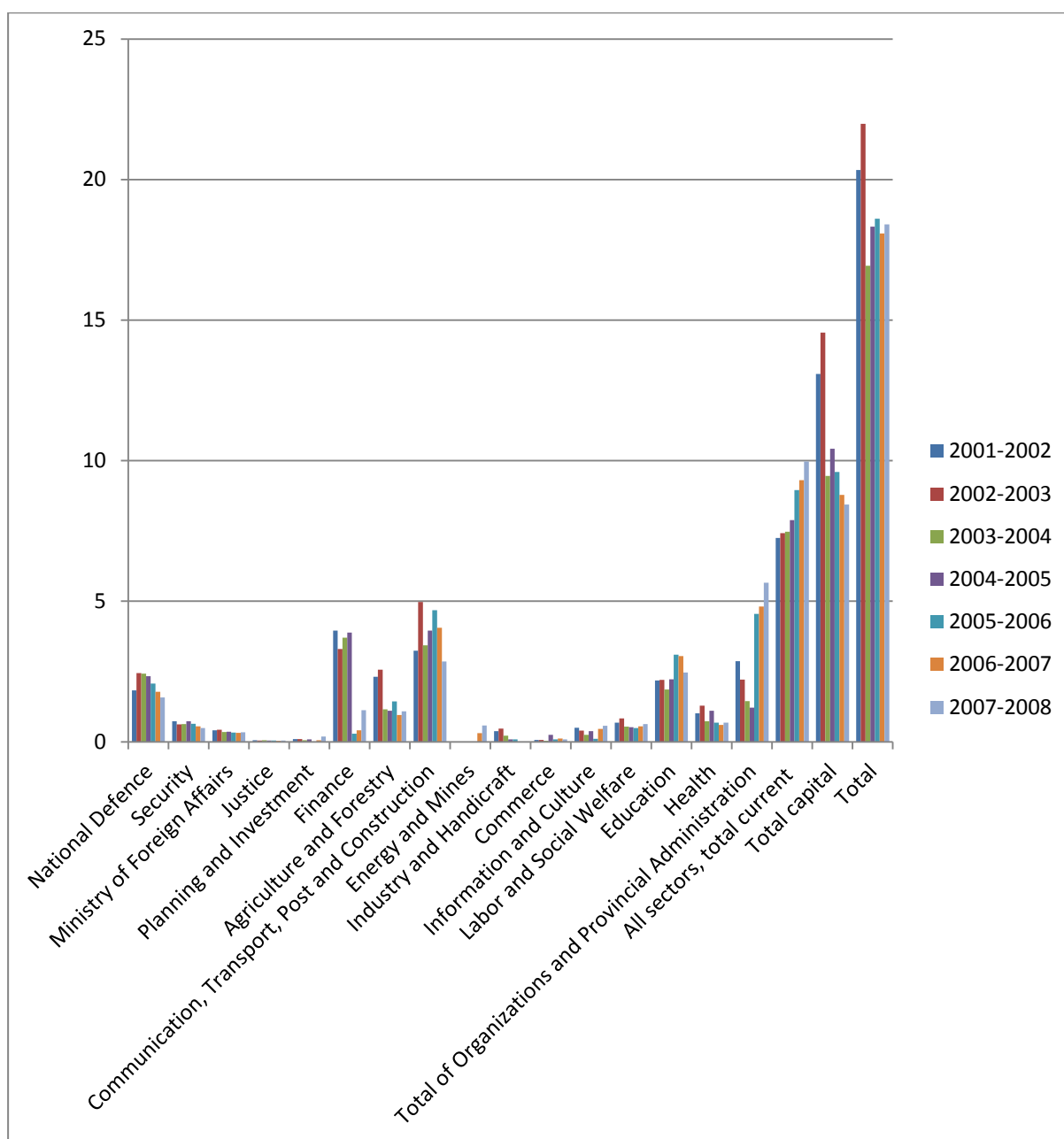


Figure 7.3. Government expenditure as percentage of GDP (Menon & Warr, 2013).

Total expenditure and total revenues can be compared for the years 2003–2004 to 2007–2008. The data show a marked reduction in the size of the fiscal deficit over this period, from 4.6% of GDP to 1%. The Lao PDR experienced a period of hyperinflation following the 1997–1999 Asian financial crisis, deriving from monetization of large fiscal deficits. The lesson was learned. One use that has been made of the rising level of government revenues is to cut back on the size of the budget deficit. (Menon & Warr, 2013).

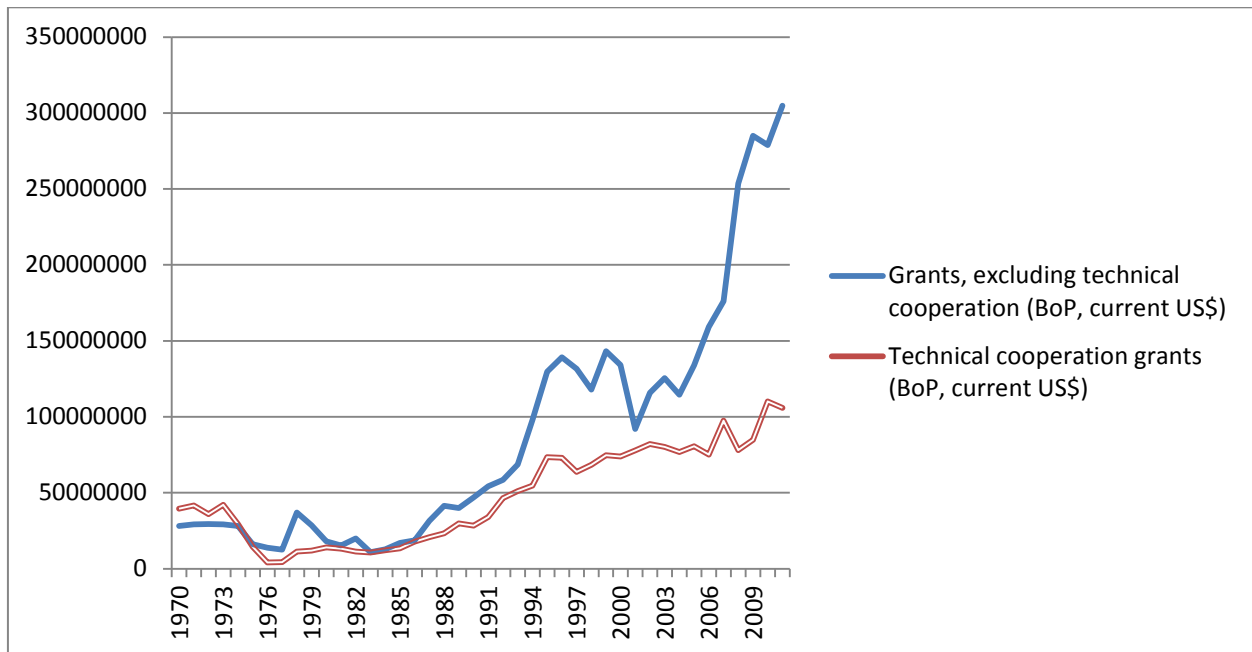


Figure 7.4. Grants and technical cooperation grants in Lao PDR, years 1970-2011 (World Bank 2013).

In Fig 7.4 historical development paths of technical and other grants are visualised. We can observe that the development of technical cooperation grants has not so much increased than other development grants. However, the amount of technical cooperation grants has more than doubled from the starting year 1970. The amount of other grants has multiplied its size six times.

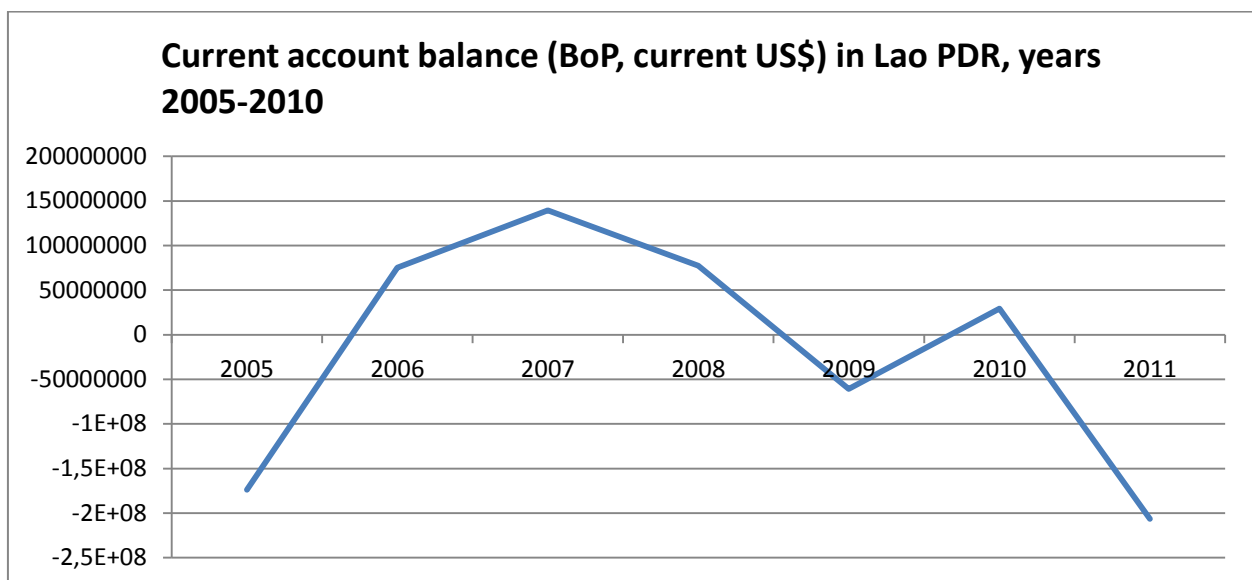


Figure 7.5. Current account balance, (BoP, current US dollars), years 2005-2011.

According to the Economic Statistics Database (2013) service provided by EconomyWatch.com, Lao PDR was No. 144 in world rankings according to Current Account Balance (US Dollars) in year 2013. The world's average Current Account Balance (US Dollars) value is US\$ 8.56 Billion; Laos is US\$ 10.96 less than the average. (Economic Statistics Database 2013). The World Bank statistics show that the Lao PDR is

having some problems with current account balance (see Fig 7.5). The balance has turned to negative (about 200 Millions of USD) during the financial crisis. This creates an economic planning challenge for the Lao PDR. Of course, this deficit limits possibilities of Lao PDR to invest in infrastructure and new emerging sectors of the Lao economy.

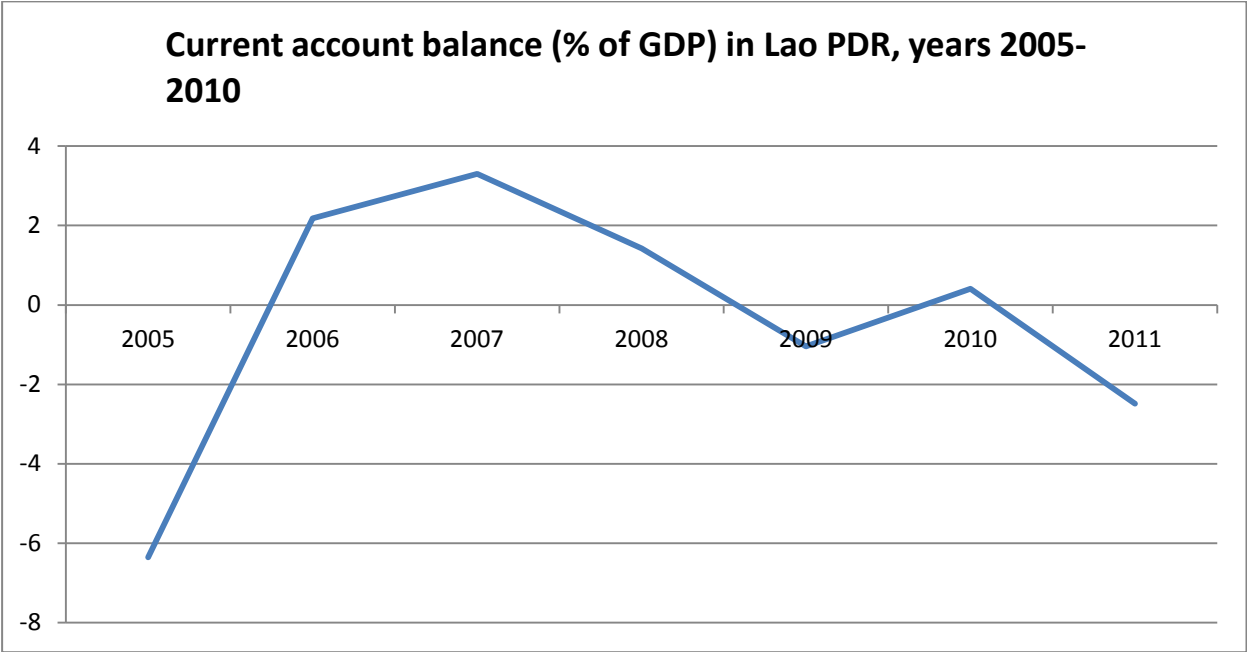


Figure 7.6. Current account balance (% of GDP) in Lao PDR, years 2005-2011.

Fig 7.6 visualises the percentage of the current account balance in the Lao PDR. In 2005, it was about -6.3% and it was positive in 2007, about 3.3% and in 2011 it changed back to negative, -2.4%.

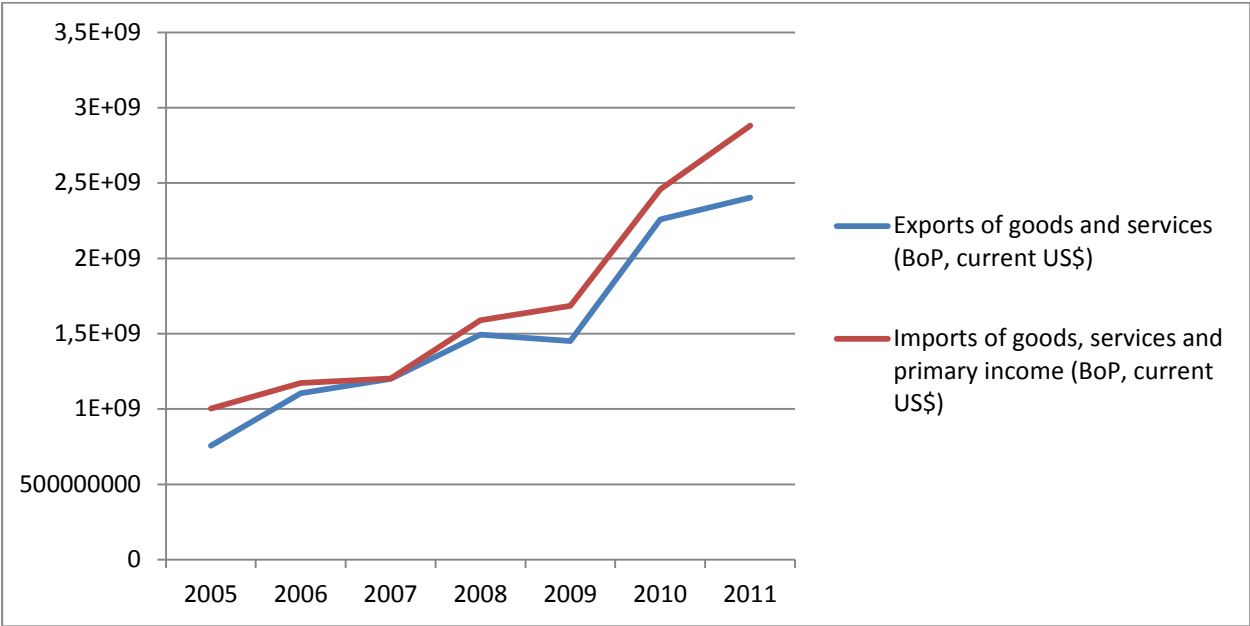


Figure 7.7. Exports and imports of goods and services in Lao PDR (BoP, current US dollars), years 2005-2011.

Fig 7.7 visualises the development of trade in the Lao PDR. In volumes it has increased considerably. Export has multiplied its size two times and also import has increased about two times in period of 2005-2011. We can conclude that the Lao economy has internationalised and globalised in recent years. Changes in the volume of trade have been considerable.

8. ADAPTIVE MECHANISMS AND CHALLENGES OF RESOURCE GOVERNANCE IN THE LAO PDR

Vast natural resources have enabled the country to post high growth rates and accelerate poverty reduction efforts, but at the same time new challenges have emerged around sustainability, governance, and equity. Lao PDR is facing a big challenge of how to turn the country’s vast natural resources and growth deriving from these exports to economic and social development in an environmentally, socially, and economically sustainable way. To achieve its socioeconomic objectives, the country needs to manage its natural resources (agricultural land, forestry and protected areas, minerals, and hydroelectric potential) by implementing proper policies and institutions built to ensure environmental and socio-economic sustainability (see e.g. World Bank, 2010).

Table 8.1. Private domestic and foreign investment from 2006-2010 (USD billion) (Investment Promotion Department, Ministry of Planning and Investment).

Fiscal year	Total investment	Local investment
Total	11.01	2.2
2005-2006	2.70	0.4
2006-2007	1.14	0.2
2007-2008	1.22	0.3
2008-2009	4.31	0.9
2009-2010	1.64	0.3

In Table 8.2 we report percentage changes of sectoral foresight direct investments.

Table 8.2. Foreign direct investments and percentage changes of foresight direct investments (sectoral allocations).

	2008	2009	2010	2011	2012	
Agriculture	13 889 289	14 510 778	16056026	17628847	18 929 362	16 202 860
%-change		4	11	10	7	8
Crops, animal raising, and hunting	12 334 548	12 869 418	14228550	14263735	15 570 883	14 233 147
%-change		4	11	0	9	6
Forestry	1 870 767	1 548 874	1549220	1 337 819	1 166 110	1 400 506
%-change		-17	0	-14	-13	-11
Fishing	1 554 741	1 641 360	1832171	2 027 293,00	2 192 368	1 923 298
%-change		6	12	11	8	9
Industry	11 953 908	11 668 891	14657227	1978187	2 267 729	7 643 008
%-change		-2	26	-87	15	-12
Mining and quarrying	4 595 013	3 289 385	4273402	6 833 713	7 285 994	5 420 624
%-change		-28	30	60	7	17
Manufacturing	3 998 754	4 833 230	5231656	6 246 070	7 456 422	5 941 845
%-change		21	8	19	19	17
Electricity and water	1 172 881	1 280 903	2238923	2851839	3 048 872	2 355 134
%-change		9	75	27	7	30
Construction	2 187 259	2 265 373	2913245	3 849 565	4 886 000	3 478 546
%-change		4	29	32	27	23
Services	17 281 815	18 419 863	22227016	23 571 010	26 992 379	22 802 567
		7	21	6	15	12
Wholesale and retail trade, repairs	8 741 788	9 333 249	11485198	12 085 040	13 883 535	11 696 756
		7	23	5	15	12
Hotels and restaurants	301 114	330 517	405196	439 456	512 864	422 008
		10	23	8	17	14
Transport, storage, post and communication	2 120 044	2 309 587	2847441	2 928 779	3 165 475	2 812 821
		9	23	3	8	11
Financial intermediation	1 483 520	1 619 854	2040133	2 242 097	2 616 897	2 129 745
		9	26	10	17	15
Real estate and business services	1 456 928	1 493 807	1623532	1 885 507	2 123 488	1 781 584
		3	9	16	13	10
Community, social and personal services	755 254	817 353	911858	1 026 421	1 123 859	969 873
		8	12	13	9	10
Private households with employed persons	299 431	343 592	386623	406 885	447 484	396 146
		15	13	5	10	11

When we analyse these percentage changes of FDIs, we can conclude that there are enormous changes in sectoral investment volumes. That is a challenging issue for planning of the Laotian economy.

In 2013 Laos has position 18 among Asian Pacific Investment Climate Index (APCI). The APCI index is based on six variables: Rule of Law, Openness to International Trade and Business, Political Stability, Taxation, Corruption and Fiscal and Monetary Administration. Thus, there are many issues to develop in the strategy of foreign direct investments in Laos. Singapore, Hong Kong and New Zealand have top positions of APCI (Vrien and Partners 2013, 7, 25).

Vrien and Partners analyse the investment climate and conditions in Laos in the following way (Vrien and Parnters 2013, 25): “The Lao PDR remains low on this year’s index, although the country continues to make impressive strides in attracting foreign investment. Laos has sustained one of the highest economic growth rates in the region, and the country is progressing somewhat towards becoming a market economy. Laos’ ranking is bolstered by its strong score on political stability. Laos is politically stable, but the LPRP’s concentration of power and growing wealth among party elite breed corruption. The country is following a political development model similar to China’s, and political dialogue and dissent are rare. Corruption is widespread at all levels of government and remains the fundamental barrier to investment. Despite the development of several anti-corruption laws, enforcement is inconsistent and weak, and no high-profile cases have been brought to trial.”

They (Vrien and Parnters 2013, 25) continue analyses: “Laos is hoping that WTO accession will provide a stamp of legitimacy that will attract increased and diversified investment to reduce dependency on powerful neighbouring countries, including China and Thailand. Yet, Laos’ goal to graduate from the list of least developed countries by 2020 depends on its ability to channel revenues to develop its limited human capacity and improve governance processes.” Thus, human capacity question will be one key issue, as well as better investment climate conditions. These analyses indicate that Laos has similar challenges than China had before its radical political changes.

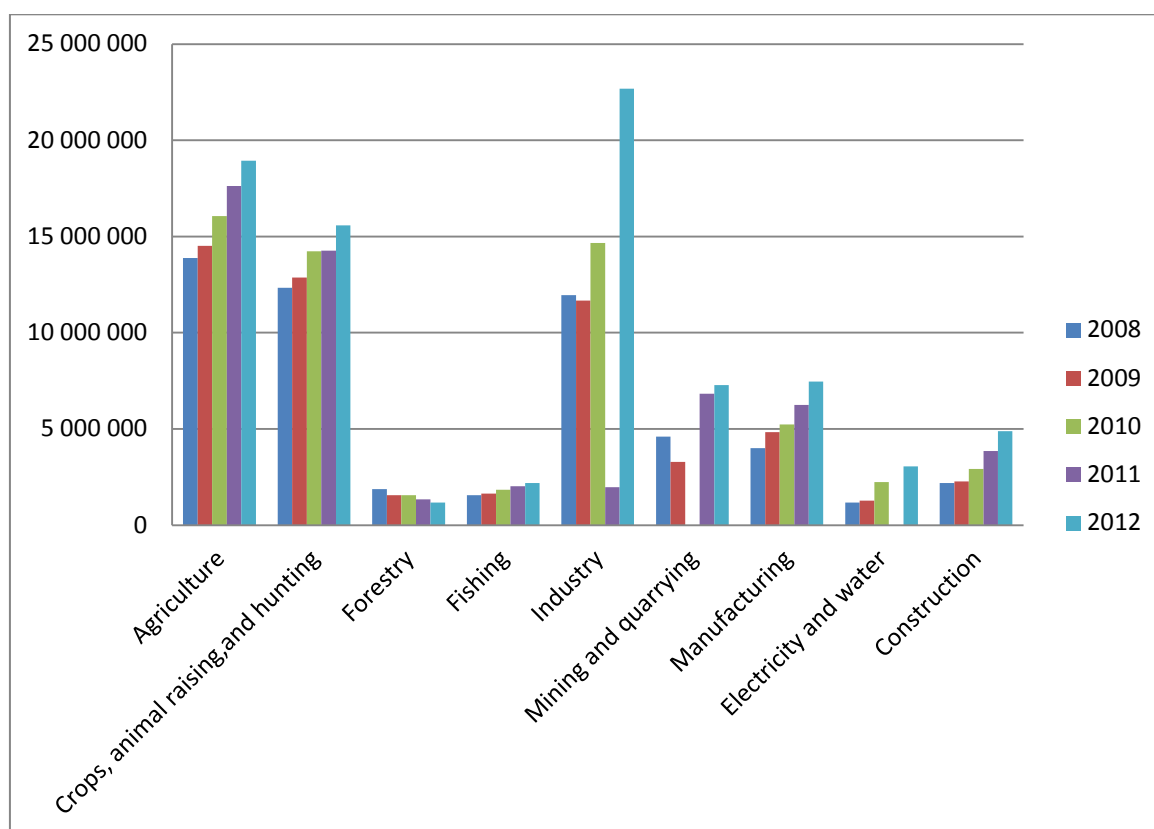


Figure 8.1. Development of the economic sectors in Lao PDR in 2008-2012.

Fig. 8.1 visualises key development of heavier industries of the Lao economy. The most important sectors of heavier industries are basic industry, mining and carrying manufacturing and construction. The Lao PDR is still agricultural economy because the volumes of agriculture and crops, animal raising and hunting are very considerable in their size. In 2012 the size of agriculture was 2.5 times bigger than manufacturing sector. Increasing sectors of the Lao economy are almost all heavier sectors of the economy. Only forestry and fishing seem to have problems in growth dynamics.

In many economy policies discussions, experts emphasize the strategic roles of mining and quarrying and electricity and water sectors. However, many branches of industries are having bigger shares of GDP in the Lao PDR. For the livelihoods of people agriculture crop and animal production are still very important in Laos. In recent years, industry and manufacturing have increased their size in economic activity. We can expect that the industrialisation process is in the starting phase and it has a huge potential because of available mineral and hydro energy resources. Because the Lao PDR does not have large financial capital foreign direct investments are needed to finance industrial investments. Also, the modernisation of agricultural sector requires investments. Demographic structure of Lao PDR is going to be very favourable for economic growth for the next twenty years. Vientiane Metropolitan region provides exceptionally favourable environment for investments and dynamic economic growth. One key planning challenge will be regional economic disparities and imbalances because in many provinces demographic structures will not be so favourable comparing to the growth centres and special economic zones of the Lao PDR. (See Chapter 4).

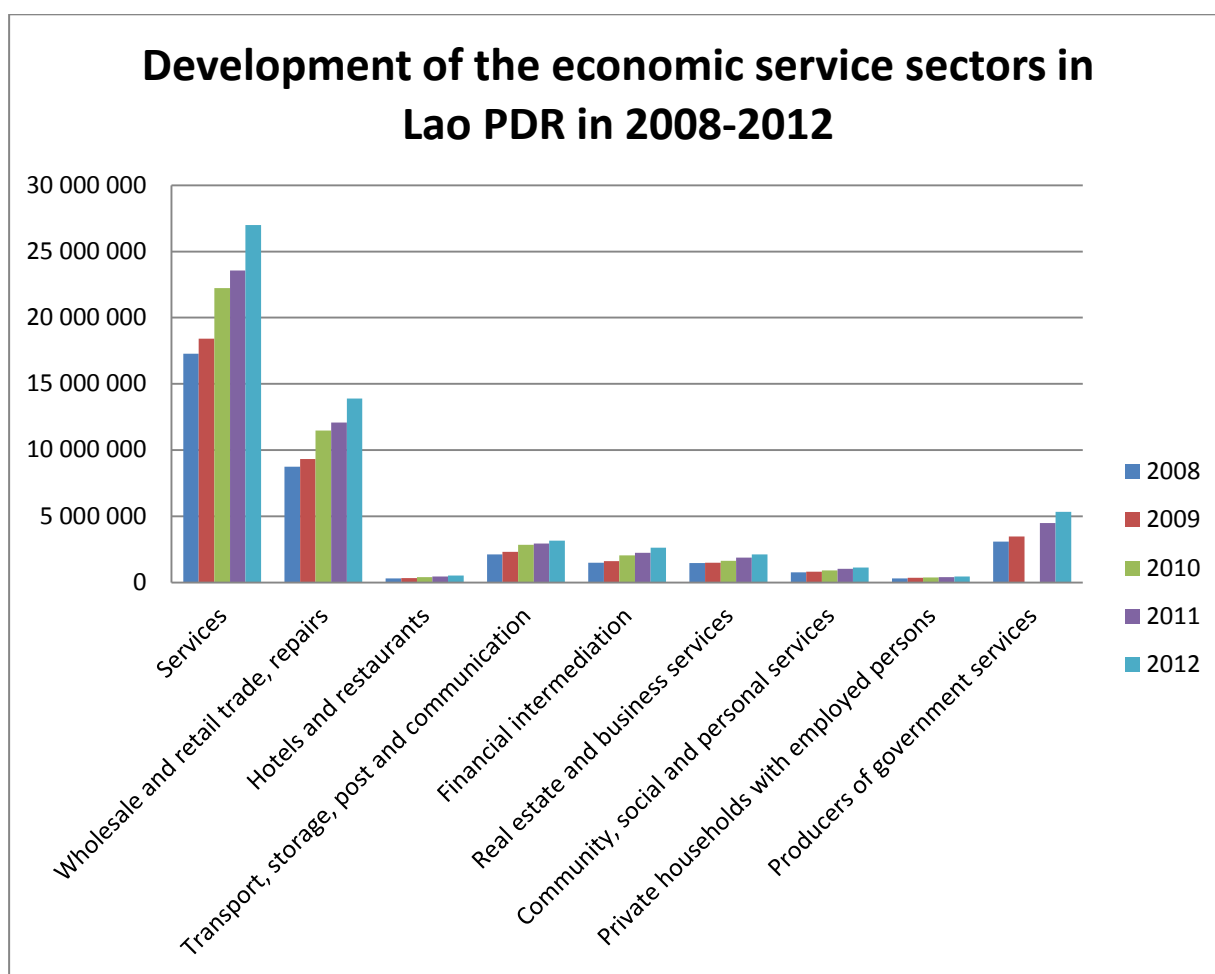


Figure 8.2. Development of the economic service sectors in Lao PDR in 2008-2012.

Fig 8.2 reports recent developments in economic service sectors in the Lao PDR. One can see that services and wholesale and retailing business has increased in recent years. In other service sectors there has been less growth. Many experts underline the importance of financial sector for the future of Laotian economy. In this sector there have been some positive developments but not so much that have been expected. The production of government services has also increased in the Lao PDR. Probably this increase is based on the expansion of education services and health care sector. Also, transportation, storage, post and communication sector has increased in volumes.

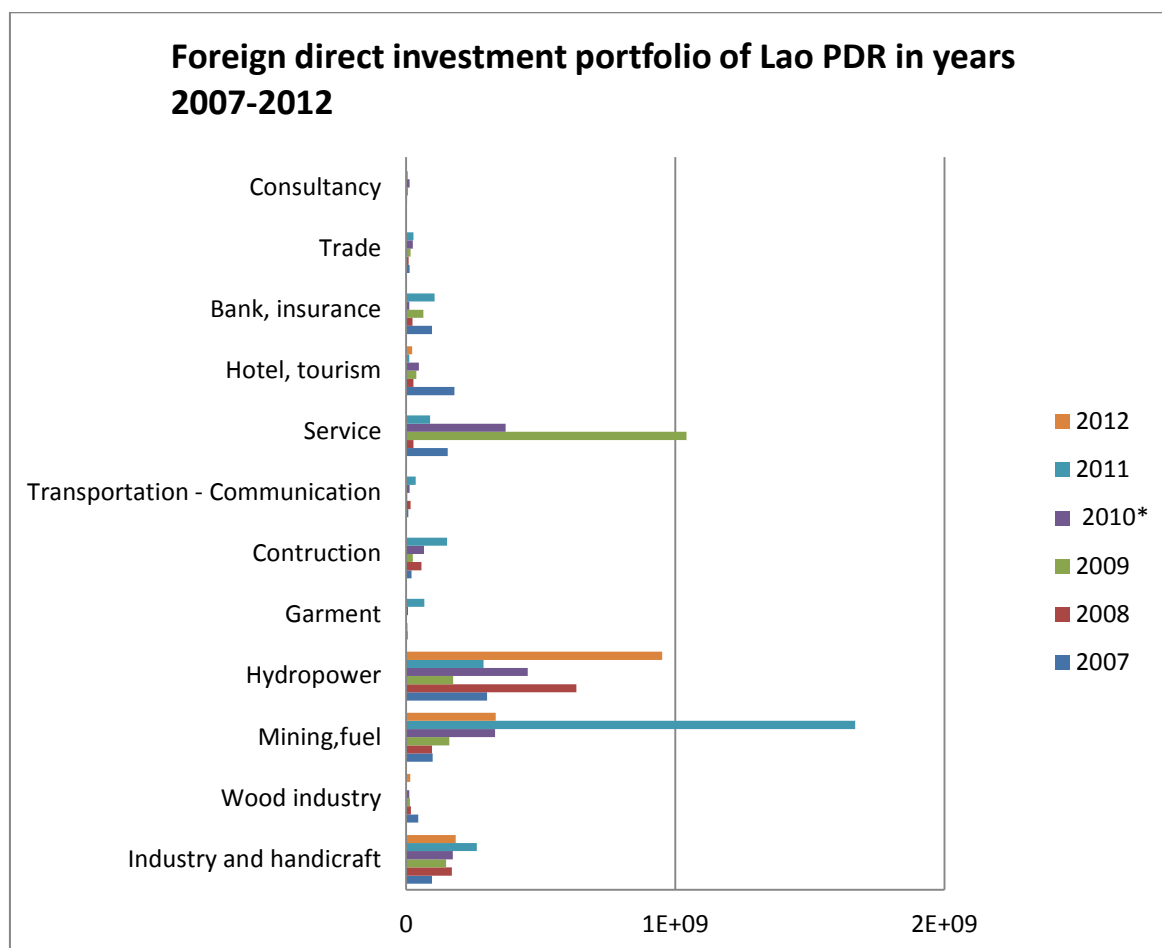


Figure 8.3. Foreign direct investment portfolio of the Lao PDR in years 2007-2012.

Figure 8.3 visualizes foreign direct investment portfolio of the Lao PDR in years 2007-2012. In general, in the national economy of the Lao PDR investments are needed for boost the economic growth and prosperity of the poor country. The leading sectors of the FDI activity are mining and hydropower sectors. One can also see that there was a huge boom in hotel and hospitality sector of the Lao PDR because of South-east Asian Games in 2009. There is no need to underestimate the importance of investments in industry and handcraft. We can expect that investments in hydropower sector and mining are having many long-run benefits and other impacts on the economic development of the Lao PDR. However, in the shorter run other sectors of the economy may be even more important for the ordinary people in Laos. There are big concerns about Dutch disease problem (Menon & Warr, 2013) in the Laotian economy. That is why there is a vital need to attract FDIs to other sectors outside hydro sector and mining industries.

Specific FDI statistics for different industrial and service sectors are reported in the following figures.

Figures 8.4-8.10 visualize the developments in heavier industries of the Lao PDR and Figures 8.11-8.15 visualize the developments of service sectors in the Lao PDR. These analyses are based on official statistics of Lao PDR (see Lao Statistics Bureau 2014a).

Fig. 8.4 reveals that variations in FDIs of agriculture-forestry sector have been considerable. The peak year was 2010, but in 2012 FDIs of agriculture-forestry were very low in Laos.

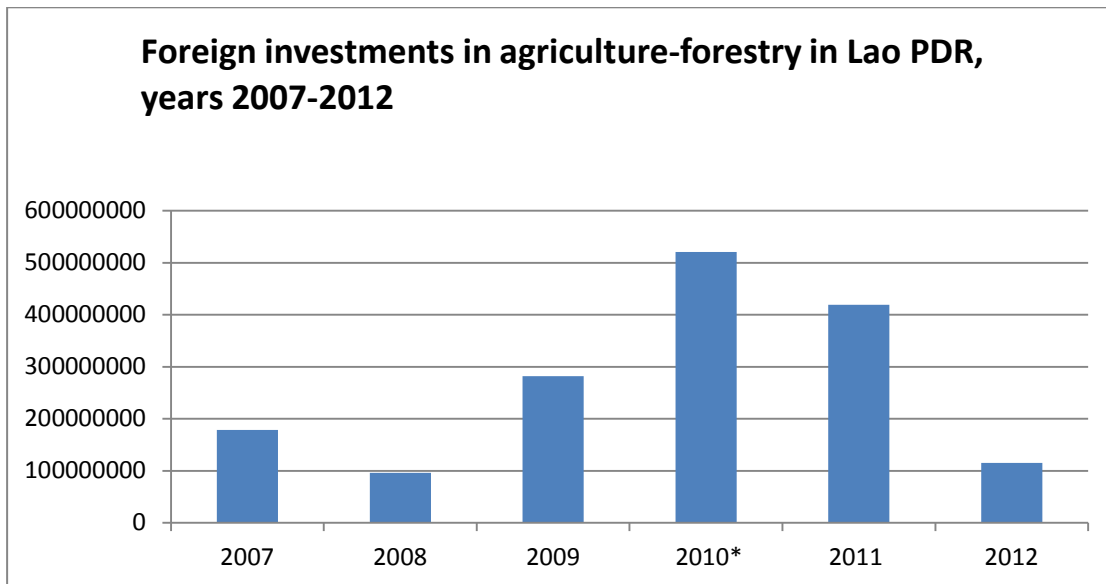


Figure 8.4. Foreign direct investment in agriculture-forestry sector in Lao PDR, years 2007-2012.

The FDIs in industry and handicraft have been increasing in Laos. Fig. 8.5 illustrates a positive trend in these fields of industrial development.

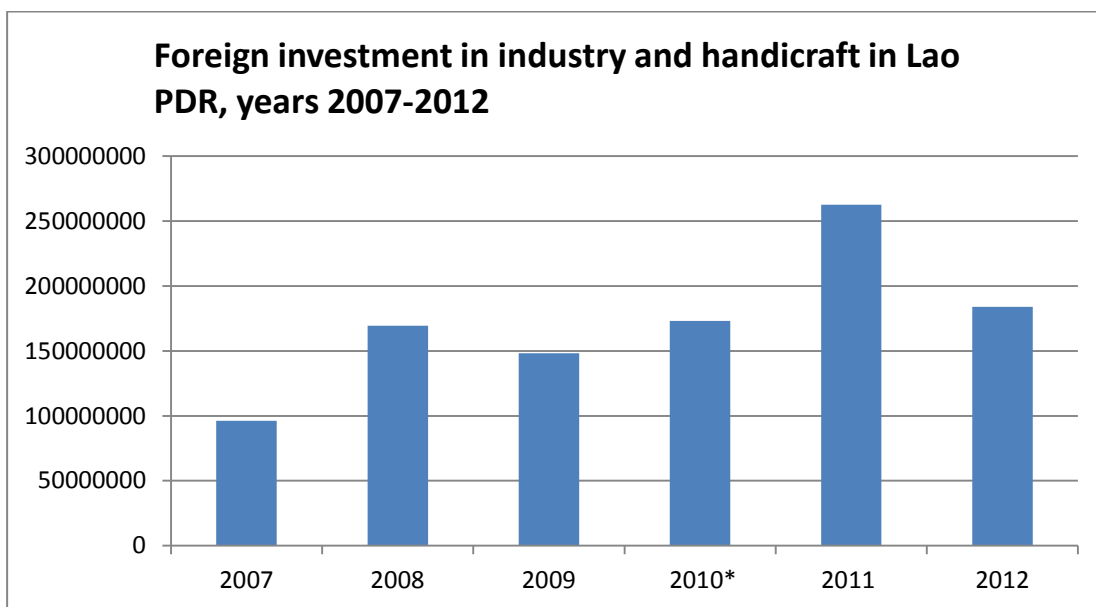


Figure 8.5. Foreign direct investment in industry and handicraft in Lao PDR, years 2007-2012.

Fig. 8.6 visualizes the FDIs in wood industry. In this field we can observe a decreasing trend since 2007.

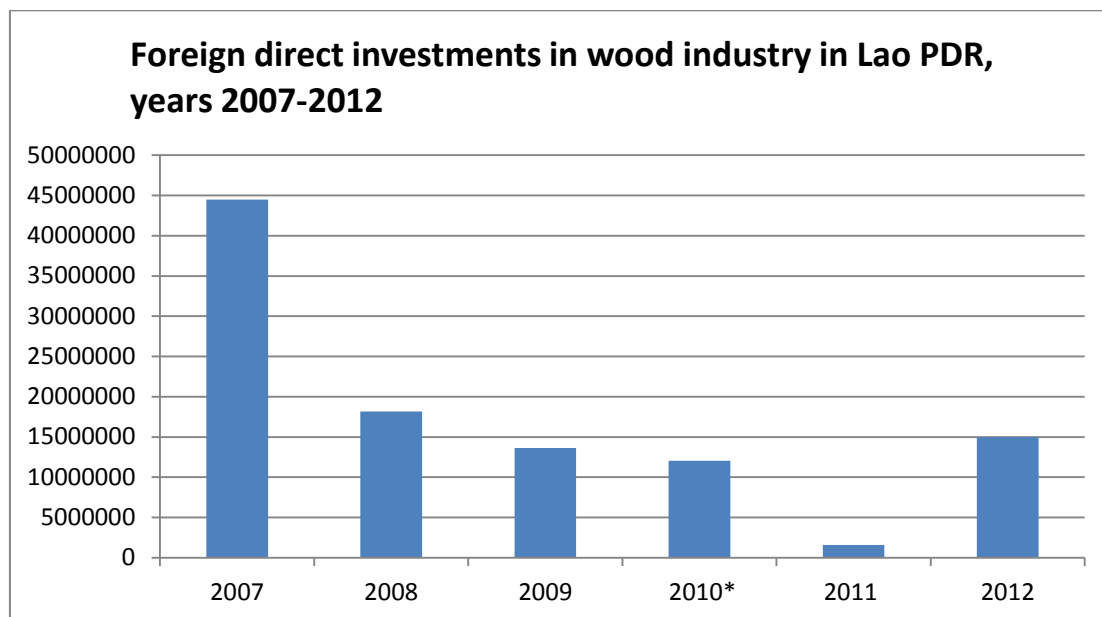


Figure 8.6. Foreign direct investment in wood industry in Lao PDR, years 2007-2012.

Fig. 8.7 visualizes the FDIs in mining and fuel sectors. In this field we can observe an increasing trend since 2007, but in 2012 positive trend turned to negative direction.

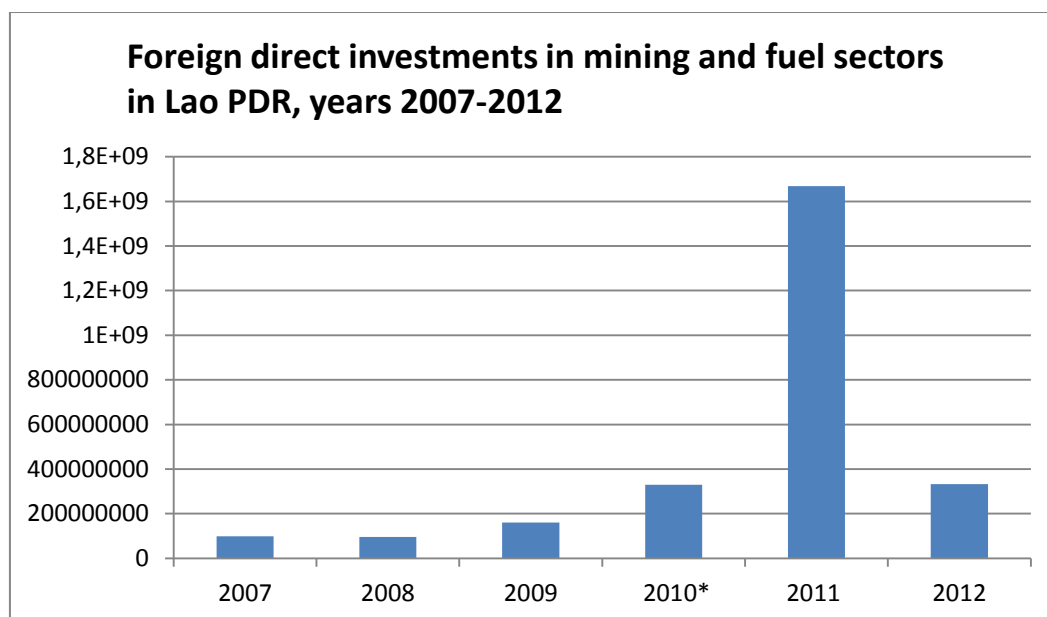


Figure 8.7. Foreign direct investment in mining and fuel sector in Lao PDR, years 2007-2012.

In Fig 8.8 we have reported the FDIs in hydropower sector. There have been remarkable FDIs in this sector, but also yearly variations are considerable.

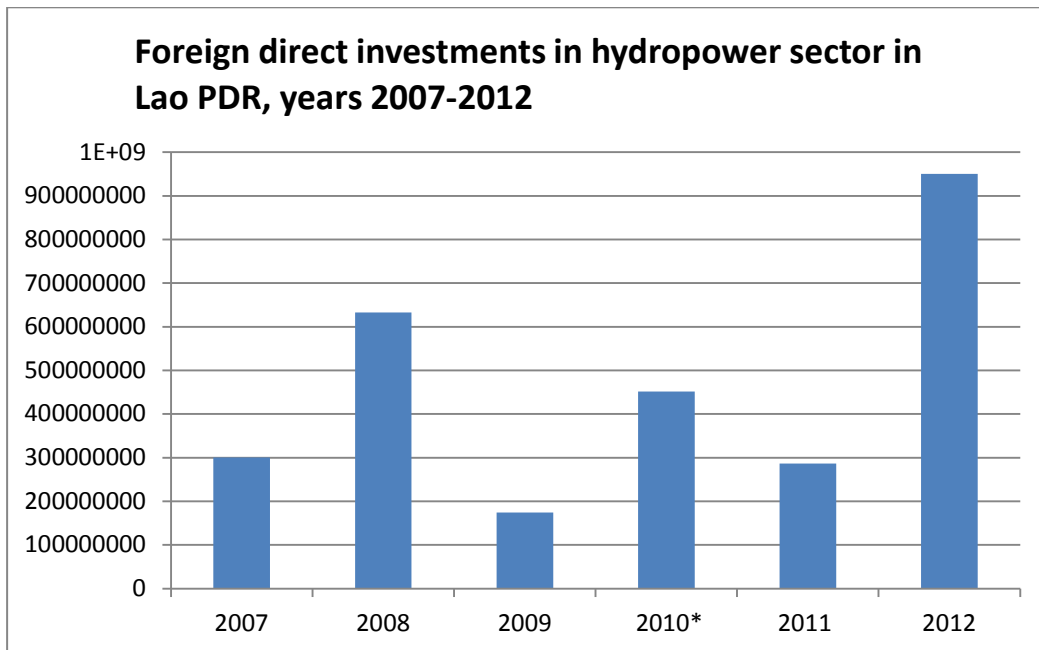


Figure 8.8. Foreign direct investment in hydropower sector in Lao PDR, years 2007-2012.

In Fig. 8.9 the FDIs in garment sector are visualized. In 2011 there were 90 to 100 garment factories in the country, 54 which are members of the Lao Garment Association. Of these 54 factories, 26 are foreign-owned, 13 are joint ventures and 15 are pure Lao factories (Oraboune, 2011). This sector looks to be very promising branch of industry in Laos. Probably we have not seen its full success story yet.

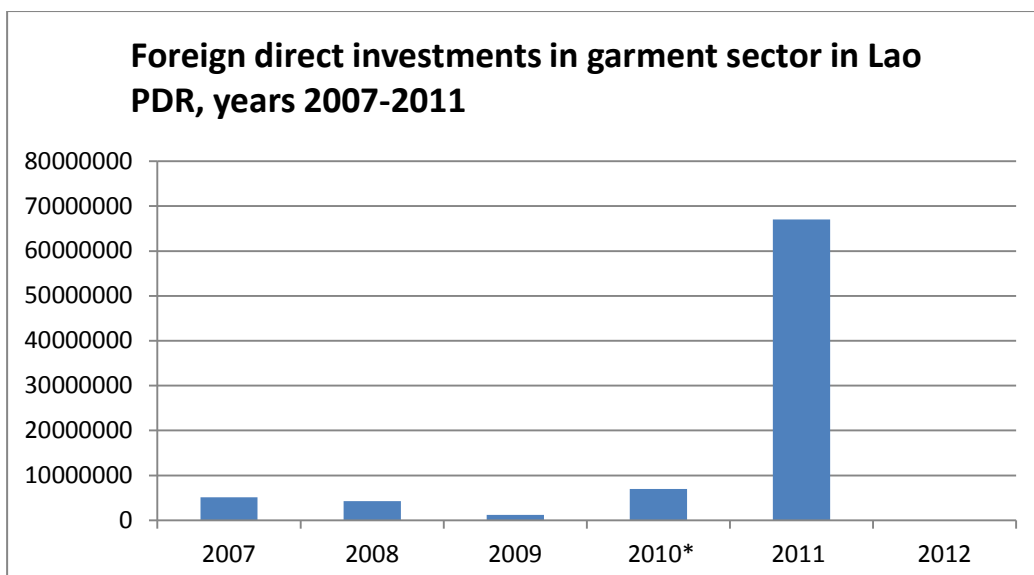


Figure 8.9. Foreign direct investment in garment industries in Lao PDR, years 2007-2011.

In Fig 8.10 we have reported the FDIs in the construction sector. This sector has strong upward sloping trend in Laos. Cyclical variations are, however, remarkable in this turbulent sector.

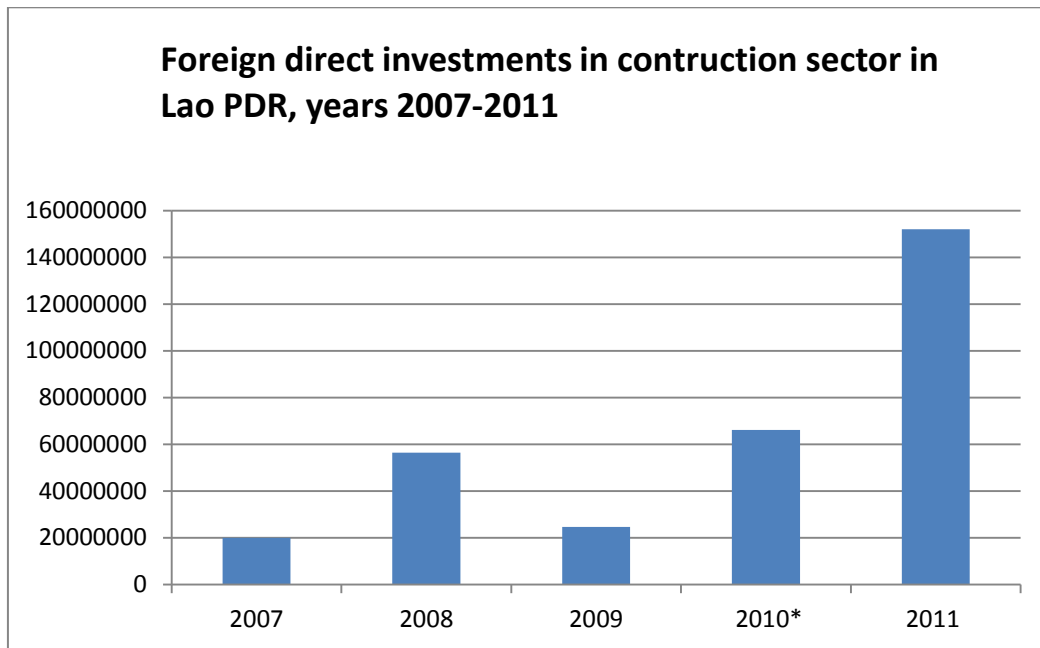


Figure 8.10. Foreign direct investment in construction sector in Lao PDR, years 2007-2011.

In Fig. 8.11 we have visualized the FDIs in transportation and communication sectors. The trend in this field is showing signals of increasing investments.

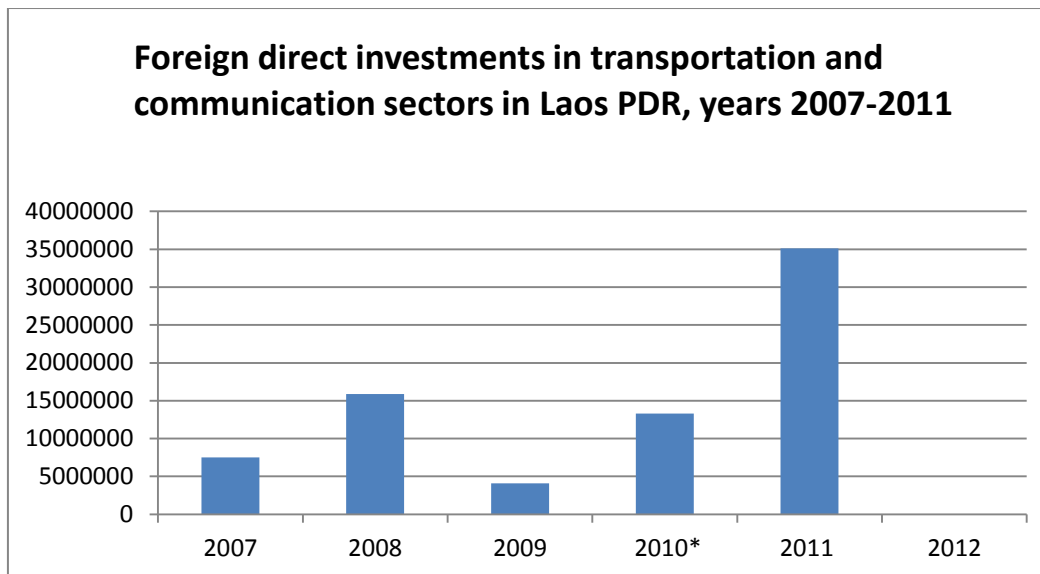


Figure 8.11. Foreign direct investment in transportation and communication sectors in Lao PDR, years 2007-2011.

In Fig. 8.12 the FDIs in service sector are reported. The peak year of FDIs in this sector was in 2009.

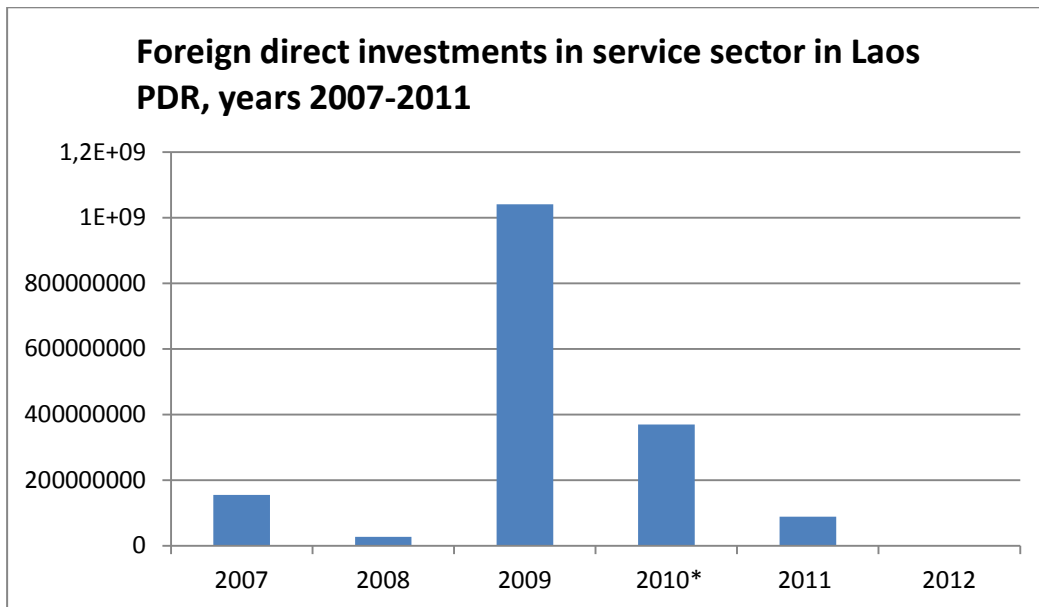


Figure 8.12. Foreign direct investment in service sector in Lao PDR, years 2007-2011.

The FDIs in hotel and tourism sector are reported in Fig. 8.13. We can observe a very stable development in this growing branch of economy in Laos.



Figure 8.13. Foreign direct investment in hotel and tourism sectors in Lao PDR, years 2007-2012.

In Fig. 8.14 we can observe the FDI in bank and insurance sector in the Lao PDR. Also here we can see stable development trajectory.

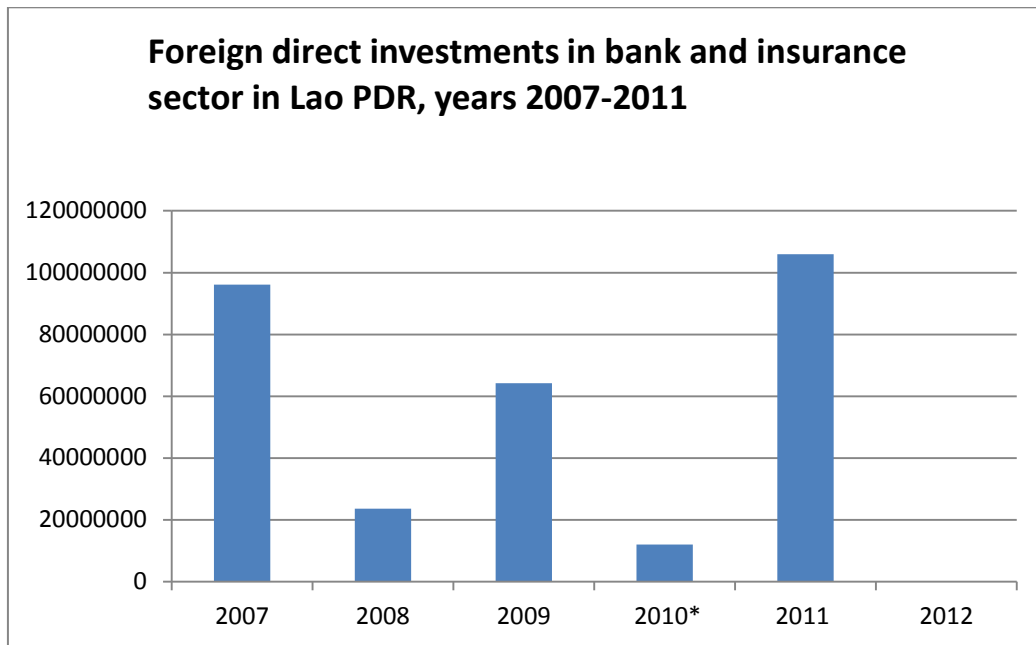


Figure 8.14. Foreign direct investment in bank and insurance sector in Lao PDR, years 2007-2011.

In Fig. 8.15 the FDIs in trade and consultancy are reported in the Lao PDR. Both fields of economy are increasing in Laos.

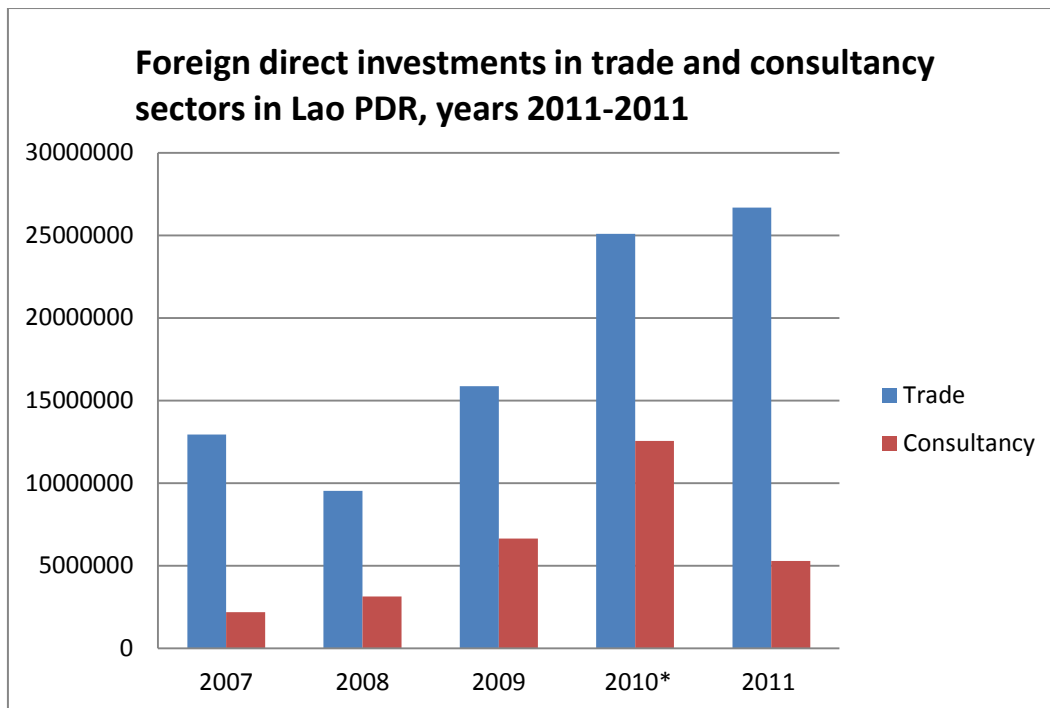


Figure 8.15. Foreign direct investment in trade and consultancy in Lao PDR, years 2007-2011.

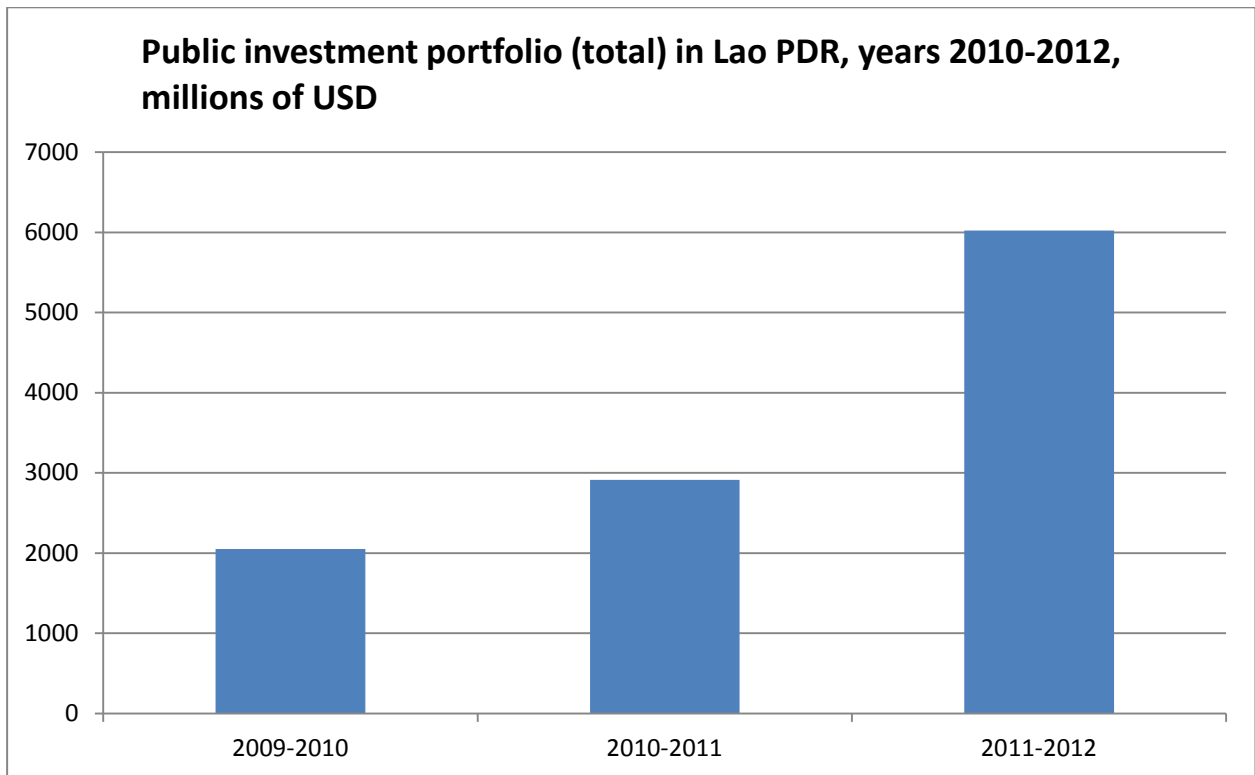


Figure 8.16. Public investment portfolio (total) in Lao PDR, years 2010-2012, millions of USD (Lao Statistics Bureau, 2014a).

Figure 8.16 visualises public investment portfolio (total) in Lao PDR, years 2010-2012. We can observe that the scale of investments have increased considerably in the Lao PDR. Public investment portfolio has multiplied three times during the period of 2010-2012. This a dramatic change in public investments.

The details of public investment portfolio in the Lao PDR is reported in the Figure 8.17 (Lao Statistics Bureau, 2014b).

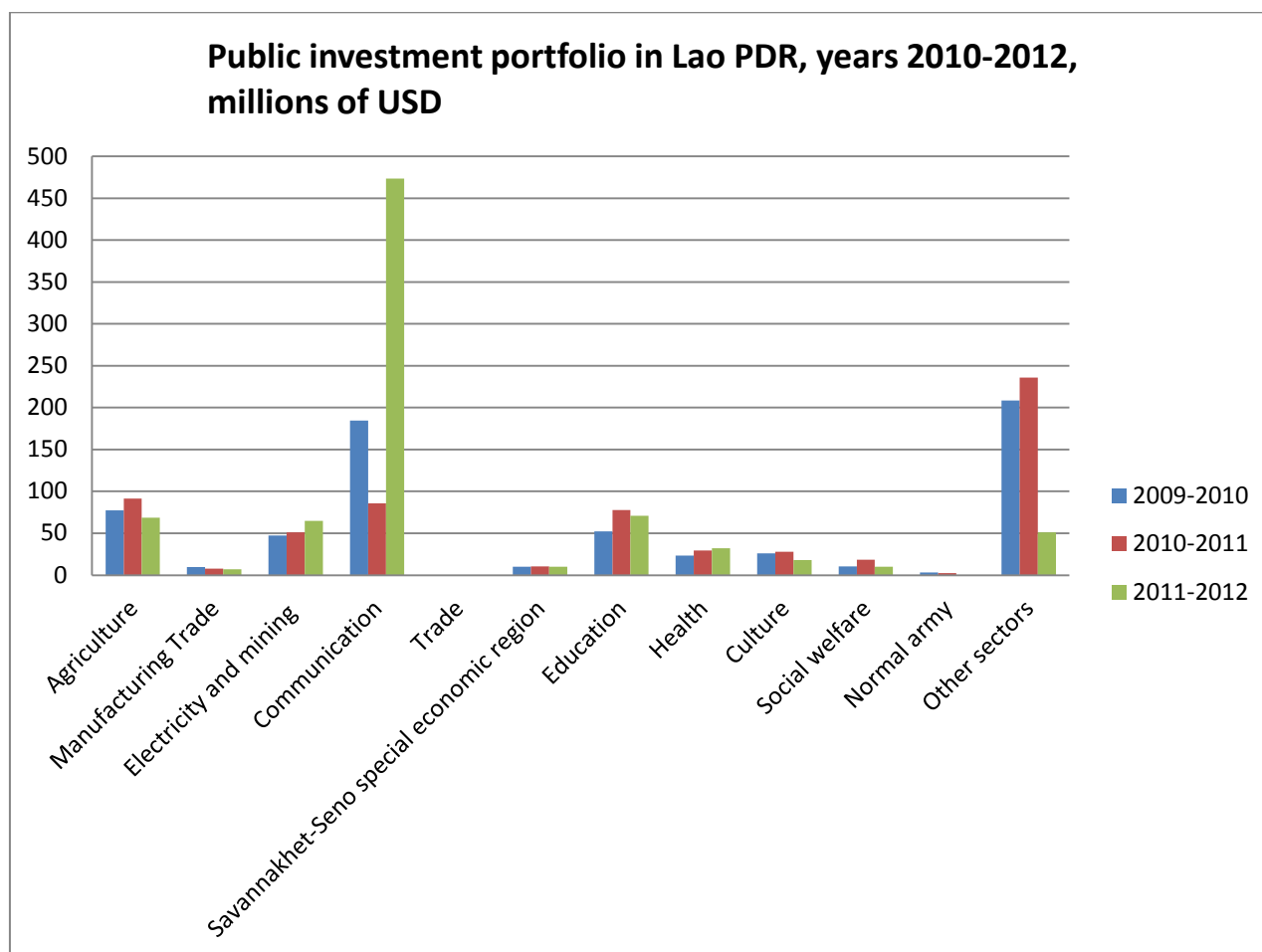


Figure 8.17. Public investment portfolio in Lao PDR, years 2010-2012, millions of USD.

The statistical reporting system of the Department of the Statistics (Lao Statistics Bureau, 2014a) has reported this kind of numbers of public sector investments. The problem in the reporting system is that there are two sectors which seems to be aggregated to one variable: communication and other sectors. The investments in these fields are very considerable. It would be interesting to have a more detailed reporting statistics of these two very big sectors. The public sector has invested in education, electricity, mining and agriculture. We expect that communication sector includes investments in internet and other communication infrastructures. The Communist Party has also a special investment program for Savannakhet-Seno special economic region. We expect that some investments of communication and other sectors are allocated to normal army sector and to trade because their sizes are not so big in this Figure 8.17.

In current situation there are many uncertainties in the global economic outlook of the ASEAN region. There are still many bottlenecks in planning process as our Adaptive Foresight process revealed. For example, urbanization process of Laos needs much more attention in planning processes of the Lao PDR. The analysis reporters of Vrien and Partners (2013, p. 25) noted: “While Laos’ booming economic growth is overwhelmingly driven by rich natural resources, greater liberalization is helping the country diversify beyond hydropower dam construction and mining. Prior to acceding to the World Trade Organization in February 2013, the country reformed its regulatory and tax regimes to comply with international standards. Under the new Tax Law, standardized tax rates and business segmentation helps reduce the compliance

burden for businesses and levels the playing field for foreign and domestic businesses. This year, Coca-Cola announced plans to build its first bottling plant in the country, and French lens maker Essilor International is constructing a factory in the South-western province of Savannakhet.” Thus, there are positive changes in Laos, which probably increase investors’ confidence.

Urbanization in Lao PDR is increasing and towns and cities are becoming the engines of future growth. As this trend continues, urban planning and land management policies will become even more important mechanisms to guide socio-economic development, promote equitable development and help protect communities, the environment and cultural resources in a sustainable way. The issue of urbanization is a very broad, complex and involving cross-cutting sectoral issues.

As a summary, we can present a figure about public sector investments in the Lao PDR (Fig. 8.18).

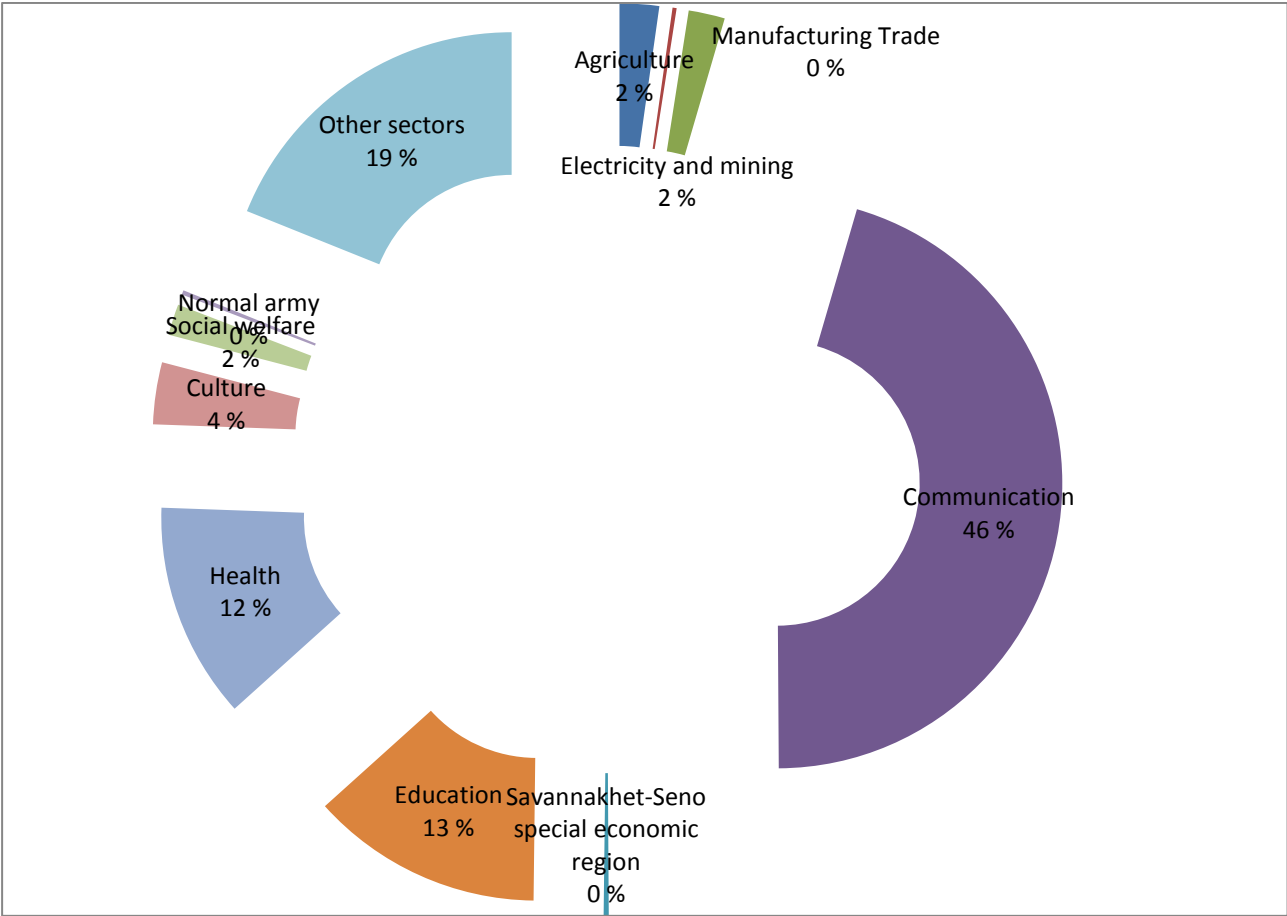


Figure 8.18. Public sector investments in the Lao PDR. Average allocations in years 2010-2012.

As a summary, we can also present Fig. 8.19 about FDI allocations in the Lao PDR.

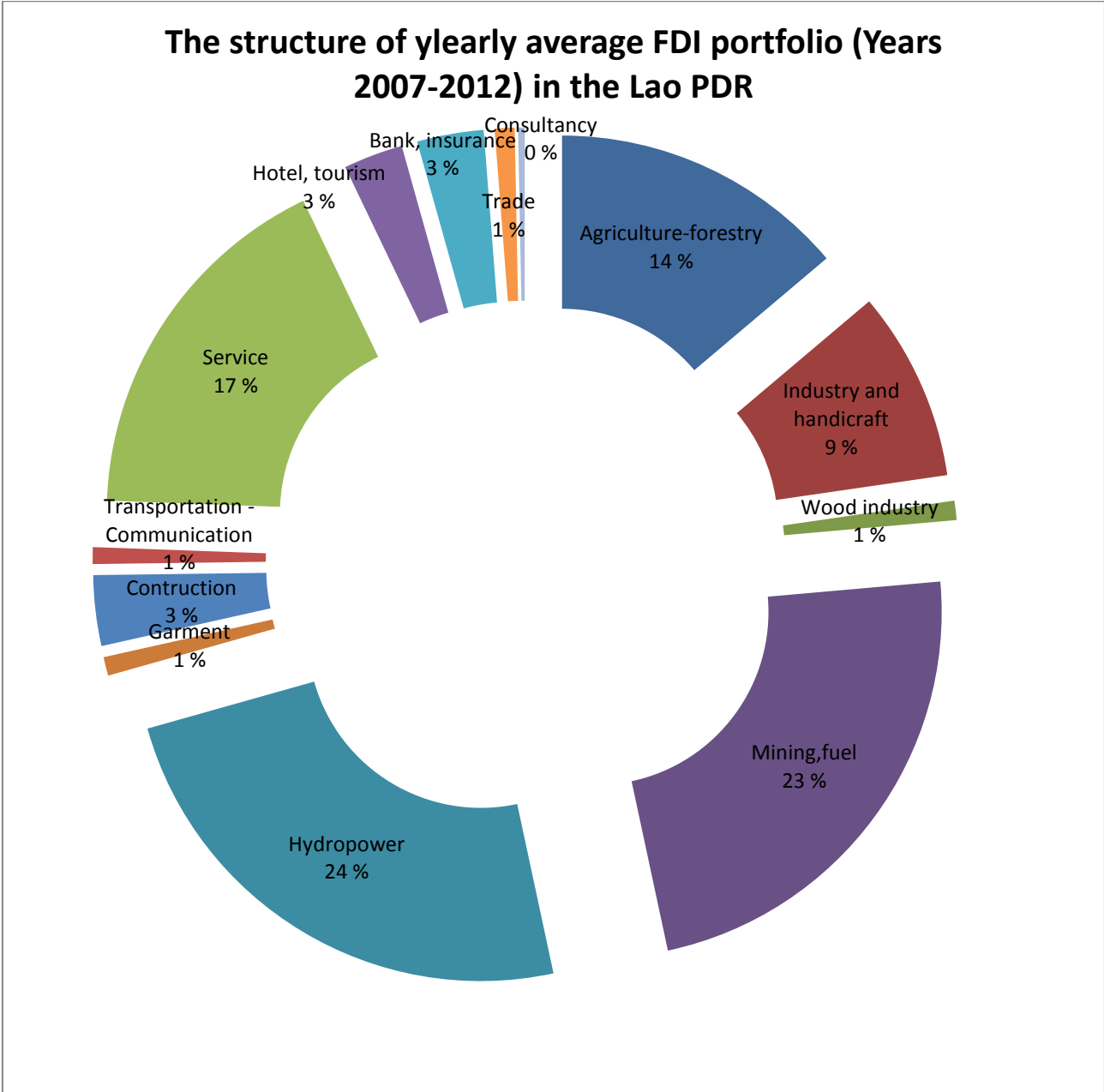


Figure 8.19. Foreign direct investments in the Lao PDR. Average allocations in years 2007-2012.

The above Fig. 8.19 informs us about the dominance of hydropower and mining investments in the FDI investment portfolio in the Lao PDR. Also service sector has got a considerable share of FDIs (17%). Industry and handicraft has got also a lot of FDIs: 9%.

9. GREEN ECONOMIC GROWTH OPPORTUNITIES

ASEAN's growing economy in the last two decades has increased the political concern of sustainable development in the face of deteriorating energy security, environmental pollution, and economic hardship in energy sector investment. In Lao PDR there are similar concerns. However, economic opportunities exist to tackle these challenging issues. Increasing (1) energy efficiency (both supply and demand side), (2) exploitation of renewable energy resources (mostly hydro), and (3) an integrated approach on energy resource management are some of the important approaches toward the sustainable energy path (Karki et al, 2005, Lidula et al, 2007). There is many political changes toward closer economic integration and co-operation in the ASEAN region (see e.g. Abdullah, 2005, Sovacool, 2009). These international co-operations possibilities should be utilised in the Lao PDR.

The discourse on international environmental policy at the level of governments, societies and enterprises has increasingly started to focus on green economy and growth, low-carbon economy and the structural change of the economy. Many international organisations, such as the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Organisation for Economic Cooperation and Development (OECD) have promoted the concept of green growth. The starting point is the recognition that sustainable development, with each of its three pillars - social, environmental and economic - reinforced and mutually reinforcing, has been the overarching goal of the international community since the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992 (UN ESCAP, ADB & UNEP, 2010). It was stated in the UN Conference on Sustainable Development (2010) that putting a focus on a green economy in the context of sustainable development and poverty eradication and the institutional framework for sustainable development can help to accelerate progress on the sustainable development agenda.

Green growth policies are a response to the traditional unsustainable energy and carbon intensive economic models based on constant growth that have caused climate change and impacted human health and national security (MLTM, PCGG, K-water & WWC, 2012). According to the United Nations (UNEP, 2011) green economy means economy which results in improved human well-being and social equity and in which reducing environmental risks and paying attention to ecological scarcities play an important role. The OECD (2011) characterizes green growth as “fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies”. UNESCAP (2012) defines green growth as “a policy focus for the Asia and Pacific region that emphasizes environmentally sustainable economic progress to foster low-carbon, socially inclusive development”.

Green growth was adopted at the 2005 Ministerial Conference on Environment and Development in Asia and the Pacific (MCED) as a key strategy for achieving sustainable development and for achieving Millennium Development Goals 1 (poverty reduction) and 7 (environmental sustainability). Pursuing green growth involves outlining a path to achieving economic growth and well-being while using fewer resources

and generating fewer emissions in meeting demands for food production, transport, construction and housing, and energy (UN ESCAP, ADB & UNEP, 2010). Greening the economy not only generates growth, and in particular gains in natural capital, but it also produces a higher growth in GDP and GDP per capita (UNEP, 2011).

An underpinning assumption of the green growth concept is that, if humans make an effort to change how they pursue economic growth, they can solve the environmental problems they have caused (MLTM, PCGG, K-water & WWC, 2012). “Greening of growth requires integrated strategies that support systemic change in integrated, complementary and mutually reinforcing ways. A key concept in approaching green growth is recognition that economic, social and environmental systems are actually complementary, not in conflict” (UN ESCAP, ADB & UNEP, 2012, xv).

Key steps to greener growth include first, establishing a vision and tracking progress based on eco-efficiency and other indicators; second, establishing an integrated policy framework based on policy tools deployed in mutually reinforcing ways; and third, re-orienting governance approaches. A policy framework for promoting environmentally sustainable economic growth is essential, and must be underpinned by specific attention to promoting systemic changes. (UNEP, 2011, viii).

There is a need for fundamental changes in the way that economies grow to address the risks and challenges of reducing poverty on a limited resource base. Technological innovation and improvements in resource efficiency alone will not be sufficient. “Governance approaches that support effective transition management towards green growth and sustainable development will be as important as setting targets and formulating strategies. A focus on improving the quality of growth, encompassing an expanded range of economic, social and environmental considerations, must become as important as, or even more important than, expanding gross domestic product”. (UN ESCAP, ADB & UNEP, 2012, xviii). There is a need to recalibrate economies to better align economic growth patterns with the pursuit of sustainable development objectives. This will require reformed and effective economic incentives frameworks in which the gap between market prices and the economic value of ecosystem goods and services is narrowed, and in which the social costs of economic activity are internalized. The transition will also require specific and complementary financing mechanisms to help close the “time gap” – the delay between investing in green growth and realizing tangible economic benefits. (UN ESCAP, ADB & UNEP, 2012, 102).

“Green growth offers the greatest opportunity for developing countries because the economic system change allows them to leapfrog to a new development stage where they can compete with industrialized countries on more equal terms. However, green growth strategies must be carefully adapted to national situations and investments prioritized depending on specific environmental, social and economic contexts”. (UN ESCAP, ADB & UNEP, 2012, 103).

9.1. Green Economy in Lao PDR

Countries throughout the world including Lao PDR are actively promoting a transition to a green economy. Today, governments across the Mekong region face the vast challenge of mitigating poverty, developing their economies and ensuring social stability and while simultaneously ensuring the health of ecosystems and the services they provide. “Green growth strategies can help economies and societies become more resilient as they work to meet demands for food production, transport, housing, energy and water” (UN ESCAP, ADB & UNEP, 2012, iii).

Laos is especially prone and vulnerable to environmental risks, contamination of water and soil, and to the climate change, and depends on its natural resources in securing economic growth. Moreover, rapid urbanization, growing population, resource constraints and low level of infrastructure and changes in institutional and external environment (regional integration, ASEAN Economic Community, etc.) are drivers for green growth and bring more challenges to implement green growth approaches in the country. Therefore, the challenge of eco-efficient economic growth and sustainable and inclusive resource use is critical and still growing in the country. This situation and challenges require action to mainstream green economy principles in national development strategies, business and investment plans, and people’s way of thinking and lifestyles.

9.2. Striving for Green Economy

Green growth can be seen as way to develop the country’s natural resources in an economically, socially and environmentally sustainable way. The green economy is in an initial stage of discussion on definition, principles and indicators, with no national consensus in Laos. The Lao Government is seeking for directions and mechanisms for sustainable development such as green economy and organizational improvements for overseeing and directing sustainable development in the country. (MONRE, 2012).

The Lao Government has incorporated green growth terms and concepts into its national development plans. The 7th National Development Plan raises the idea of transforming the country to be green and clean in many ways. It sets the country’s development directions and tasks which include poverty reduction, rural development, graduation from the least developed countries’ status by 2020 and transforming the country to be green and clean (Kommasith, 2012).

One target of the 7th NSEDP (2011, 105) is to ensure that the environmental impacts of development process during the plan are minimal; develop and protect forestry to cover 65 % of the total land area; and build Lao PDR as one of the greener countries in the world. The country is also implementing of integrated water resources management strategy (see Jusi, 2013; NSEDP, 2011b, 172) and establishing of early warning system to operationalise national strategy on climate change (NSEDP, 2011b, 172-176).

For the targets of rural development, poverty reduction and alleviation from the least development status the approaches stated in the NSEDP (2011, 110) are to carry out rural development, and transform the country to be green and clean, abundant in forests (including rain forests), water, and fresh air. The plan (2011, 131) also places urban development and water supply high in development agenda by enhancing the

development of green and clean cities, driven by the services sector. It promotes clean and green city development, where carbon intensities are low based on sustainable infrastructure providing high-quality services (Thanthathep and Ounnalath, 2011). Chong Chi Nai, ADB country director has stated that "A more efficient use of fossil fuels could be achieved by designing more compact, clean and green cities where transport can be arranged more efficiently" (Xinhua, 2013).

The NSEDP (2011b, 155) also places special emphasis on making Lao PDR a 'green tourism' country. It also promotes commercial agriculture and forestry production by promoting green agriculture, developing brands, and distribution networks, and attracting more investors (NSEDP, 2011b, 188).

There are already several policies and strategies taken to promote Green growth in Lao PDR (MONRE, 2012; Soukhamthat and Chanthavisouk, 2013) listed below.

- The National Constitution (1st edition 1991 and 2nd 2003) stated in Article 17 that "All organizations and citizens must protect the environment and natural resources: land, underground, forests, fauna, water sources and atmosphere"
- The solution of the Nation Congress of Party each five year, now the 9th solution of party congress 2011-15, (sustainable development)
- Long-term Strategy of Socio Economic Development to the year 2020 and National Socio-Economic Development Plans 2011-2015
- National Environment Five Year Action Plan (NEAP) (2011-15)
- Environment Sustainable Transport Strategy
- Sustainable Transport Strategy and Action Plan to 2020
- National Disaster Management Plan 2012-2015
- Renewable Energy Strategy to 2025
- Ecotourism Strategy and Action Plan 2005-2010
- Support for Multilateral Environmental Agreements
- Forestry Strategy to 2020
- National Biodiversity Strategy 2020 and Action Plan 2010
- Strategy on Climate Change of the Lao PDR and National Adaptation Programme of Action 2009
- National, Provincial Environmental Strategy to 2020
- Other relevant sector strategies

Other legislative activities related to pursuing for green growth are PM Degree on Social and Environmental Impact Assessment, institutional reform by establishing of Ministry of Natural Resources and Environment (MONRE), improved Environmental Protection Law, 2nd National Communication on Climate Change, and PM Degree on Strategic Environment Assessment (Thanthathep & Ounnalath, 2011).

Poverty and Environmental Initiative (PEI) Programme Lao PDR⁷ can be regarded as one of the green growth practices in the country. It aims to strengthen capacity of targeted central and provincial authorities to integrate poverty-environment concerns and opportunities in key development planning processes. The PEI framework outlines four outputs that will achieve the expected outcome of the project. Firstly, PEI will strengthen poverty-environment linkages in the 7th NSEDP, supporting evidence-based and policy relevant research in a manner that places environmental sustainability at the core of the government's development planning practices. Secondly, support will be provided to the Investment Promotion Department and provincial authorities to manage investments in a manner that seeks to maximize social benefits and minimize environmental impacts. Thirdly, a programme of support to former WREA, now MONRE will seek to strengthen Environmental Social Impact Assessment (ESIA) processes. Finally, PEI will target the National Assembly to enhance their awareness of poverty-environment issues and to strengthen the capacities of National Assembly members to actively integrate poverty-environment considerations when reviewing policies and legislation. (Ministry of Planning and Investment, Water Resources and Environment Administration, UNDP & UNDP/UNEP, 2011, ii).

9.3. Potential Green Growth Sectors

Shaw et al (2007) have identified sectors which have potential for green growth in the Lao PDR. These sectors are ecotourism, organic agriculture, silk handicrafts, medicinal plants and spices (non-timber forest products) and biofuels. For these sectors which are environmentally and livelihood sensitive economic growth is likely to result in an increased potential to develop “green” niche exports where opportunities exist for “win-win” gains for the economy and the environment. (Shaw et al., 2007, x).

Ecotourism Strategy and Action Plan 2005-2010 was formulated in year 2004 and it aims to promote sustainable practices in the key tourism sector. The strategy envisaged that by 2010 Lao PDR would become a renowned destination specializing in forms of sustainable tourism that benefit natural and cultural heritage conservation, local socioeconomic development and spread knowledge of the country's unique cultural heritage around the world (MONRE, 2012, 24, 25).

In ecotourism sector, the Government of Lao PDR together with the Asian Development Bank is also developing community-based ecotourism projects in many provinces of the country. The Sustainable Tourism Development Project⁸ aims to support the development of tourism in the Greater Mekong Sub-region (GMS) that is economically viable and environmentally and socially sustainable and that benefits the poor. It aims to develop demonstration subprojects in the Lao PDR and Viet Nam to improve the environment at urban and natural tourism sites, benefit ethnic groups/minorities and the poor, and protect vulnerable

⁷ More information available at: <http://www.unpei.org/what-we-do/pei-countries/lao-pdr>

⁸ <http://www.stdplaos.com>

people from potential negative impacts. The Project contributes to transforming GMS transport corridors into economic corridors by developing tourism opportunities along the roads and improving the human resource capacity of tourism small and medium-sized enterprises (SMEs) and public sector tourism organizations. It will contribute to more inclusive growth, environmental sustainability, and regional cooperation in the GMS. (ADB, 2008).

In the second “Future Resource and Economy Policies in Lao PDR till 2020” expert workshop which was held at the Chanthavinh Resort in Luang Prabang, on 29-30 of October 2009 one of the main topic discussed was tourism development. The meeting was attended altogether by 40 participants from the different GOL ministries and departments. The aim of the workshop was to analyze investment portfolios of the key sectors of the Lao PDR before year 2020. The target of the workshop was to create visions for the roadmap of future investments in the Lao PDR, and discuss about alternative development paths.

In the Tourism working group, the group participants were asked to list objectives of the tourism by the year 2020. The following list of different targets was identified:

1. To preserve the forest area for eco-tourism
2. Cultural tourism
3. Historical tourism

3: Tourism boom working group

To preserve the forest area/forest conservation for eco-tourism

Activities: encouraging villagers and tourism stakeholders to participate in the tourism activities, advertising and promoting tourism products, developing regulations and legislation for benefit sharing and setting up the needed mechanisms, electrifying villages with off-grid solutions, increasing tourism awareness, monitoring of the planted trees, establishing conservation areas

Risks and problems: low education, delays in the implementation of new laws and regulations, slow information flow between authorities, low financial resources, illegal logging and hunting

Available resources: laws and regulations, 21 national biodiversity conservation areas, organisational structure, electrification of tourism areas, forest resources (forests, wild life and NTFP)

Needed resources: monitoring of skills and equipment, human resources, external international and regional expertise, budget for implementation, maintenance of tourism projects

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Preserving the forest area/forest conservation for eco-tourism

The group named several activities that need to be considered preserving forest area for eco-tourism. These were encouraging villagers and tourism stakeholders to participate in the tourism activities, advertising and

promoting tourism products, developing regulations and legislation for benefit sharing, and setting up the needed mechanisms. Other activities identified were electrifying villages with off-grid solutions (less need for firewood for cooking), increasing tourism awareness in communities, monitoring of the planted trees (that the planted trees are taken care of), and establishing more conservation areas.

The group named following risks and problems related to forest conservation for eco-tourism: low education, delay in the implementation of new laws and regulations, slow information flow between authorities, low financial/economic resources, and illegal logging and hunting. Identified available resources for forest conservation for eco-tourism by the group were: laws, regulations and other materials, 21 national biodiversity conservation areas, organisational structure, electrification of tourism areas and forest resources like forests, wild life and NTFP (non-timber forest products). Monitoring of skills and equipment, human resources, external international and regional expertise, budget for implementation, and maintenance of tourism projects were named as needed resources for forest conservation for eco-tourism by the group members.

Cultural tourism



Cultural tourism

Activities: developing more tourism products and materials, promoting handicraft of Lao people, participation in international tourism exhibitions, promotion of natural tourism events, exemption visa for target markets, linking tourism packages with regional markets, improving the existing checking points to international standards

Risks and problems: high costs, limited budget, weak communication network, lack of marketing experts, economic recession

Available resources: stability and peaceful pace of the country

Needed resources: more financial resources (budget), development of human resources and English skills

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The participants identified many activities that need to be developed to enhance cultural tourism. These were: developing more tourism products, producing tourism materials, promoting handicraft of Lao people, participation in international tourism exhibitions, promotion of natural tourism events, exemption visa for target markets, linking tourism packages with regional markets and improving the existing checking points to international standards. The lack of marketing experts, high costs, limited budget, weak communication network along with economic recession were identified as risks and problems related to promotion of cul-

tural tourism. Stability and peaceful pace of the country were seen as available resources for cultural tourism by the participants. More financial resources (budget) are needed for developing cultural tourism along with development of human resources and English skills.

Historical Tourism

Activities that are needed for developing historical tourism were identified as preserving cultural and historical sites and developing quality standards of tourism services. The participants named two areas as available resources which could be possible cultural heritage sites. The first was Nam Ha (NBCA) which could be a potential Asian heritage site locating north-west of Laos. The area contains a diverse array of ethnic groups who are still highly dependent on the forest and NTFPs, and living relatively traditional lifestyles. The other area named was Hin Namno (NBCA), a possible World heritage site. The Eastern border of Hin Namno is the international boundary with Vietnam and is adjacent to Ke Bang forest area and the Phong Nha Nature Reserve in Vietnam. This complex forms one of the largest continuous limestone ecosystems in Southeast Asia.

These workshop results show the importance of tourism and especially ecotourism for the socio-economic development, poverty reduction and environmental protection of the country.

9.4. Green Activities in Renewables Energy Sector

Although Lao PDR lacks of conventional energy resources (e.g., oil or natural gas) and has some reserve of coal, but there are abundant renewable energy resources, such as biomass, hydropower, solar energy. In some part of the country there are some potential of wind and geothermal energy (The Government of Lao PDR 2011a, 9). According to Renewable Energy Development Strategy (GoL, 2011) hydropower is the most important energy resources in Lao PDR, which technical potential was estimated around 26,000 MW, where yet counted small scale hydropower sites below 15 MW and estimated potential around 2000 MW. In the Lao PDR hydropower projects with capacity below 15 MW are classified as small-scale hydropower.

Potential of biomass in Lao PDR includes energy crops and organic wastes. Energy crops comprise Oily crop (Palm, Jatropha, Vernicia Montana, Sun flower, Beans, coconut, etc.), sugar and starch (sugarcane, Cassava, corn) and quick growing trees and aquatic cultures. Organic wastes include residues of agriculture-forestry production, by-products of agro-forestry industry (sawdust, wood chips, rice husk, corn cobs, livestock manures) and municipal wastes (households' wastes, communal wastes, food processing wastes). (The Government of Lao PDR 2011a). These forms of renewable energy are still at an early stage of development, hydropower being the most important and utilized form of RE in the country.

According to the Renewable Energy Strategy (The GoL 2011a) the Government aims to increase the share of renewable energies (RE) to 30% of the total energy consumption in 2025. To reduce the importation of fossil fuels, the Government outlines a tentative vision to reach 10% of the total transport energy consumption from biofuels. This target will be regularly revisited and revised, feeding in results of special

studies, lessons learned from on-going implementation, and international technological developments in the field of RE. The government policy is to promote investments in energy production from public and private sectors, and from local and foreign investors. The focus is on the development of the following:

- Biofuels,
- Small power,
- Other renewable energies such as solar, biomass, biogas and wind;
- Other alternative fuels for transportation. (The Government of Lao PDR, 2011a, 16).

The Renewable Energy Strategy is an important effort of the Government aiming at sustainable development, particularly in term of self-reliant energy security; promotion of environmental sustainability, economic development and poverty reduction; and reduction of rural-urban gaps in access and gender inequalities. To realize these goals, the strategy calls for institutional arrangement and capacity strengthening, as well as measures for promotion and development. These measures include tax exemptions and reduction, promotion of investments, Clean Development Mechanism (CDM) projects, research in renewable energy, awareness raising, technology transfer and establishment of a renewable energy fund. Related to this will be the need to find options and address challenges resulting from the loss of income in the Government budget due to tax exemptions and reduction, high investments and, potentially, low usage if imported fuel is cheaper than some types of renewable energy. Collaboration will be needed with other sectors, particularly natural resources and environment, agriculture and forestry, trade, finance, investment and technology. (MONRE, 2012, 24). The renewable energy policy, strategy and national action will also provide the support to the national climate change work, recently initiated, will benefit from the suggested energy strategy, as energy consumption on rural households and urban transport being the largest polluters and emitters of greenhouse gas in the country (Milattanapheng, 2009, 6).

However, there are critics against the use of large-scale hydropower as a promoter of green economy in Laos. As the high cost of domestic grid extension and the well-known negative social and environmental impacts of hydropower, renewable energy options are widely recognised as a necessary alternative for rural electrification. “The successful development and dissemination of RE technologies in Lao PDR is reliant on their suitability and subsequent social acceptance by largely isolated rural communities in need of energy while maintaining a minimum level of income”. (Bush, 2006).

“The evidence of the costs, benefits and equity aspects of hydropower in Laos suggests that it is based on a narrow interpretation of the green economy” (Smits, 2012, 115). Smits (2012, 116) promotes smaller projects with strong local roots and capacity building aspects which could provide a much better basis for a Lao “green economy”. In the energy sector, some examples include pico, micro and small hydropower, as well as various sizes of solar PV projects and some forms of bio-energy.

Renewable energy has potential source locally which can be explored to meet the demand and support socio-economic development particularly in rural areas. However, there are several constraints and barriers to a more widespread use of renewable energy, which are awareness barriers among policy makers, con-

sumers, suppliers; financial and technical barriers and obstacles related to legal and institutional frameworks and policies. (MONRE, 2012, Theambounmy (no year).

Constraints related to awareness:

- Lack of knowledge concerning opportunities, reliability and lifetime of technologies
- Lack of knowledge concerning positive impacts on the environment from renewable energy production
- Lack of information on availability and sustainability of resources, in particular with regard to biomass

Financial constraints:

- High capital investment costs and high costs of operation particularly electrification in rural area and renewable energy development
- Lack of suitable financing system at low interest rates

Legal/institutional constraints:

- Lack of coordination between Government agencies and the private sector, which hampers renewable energy development and promotion

Technical constraints:

- Lack of local standards for renewable energy equipment and systems, given that renewable energy technologies are relatively new to the market

Environmental and social impacts:

- Lack of effective measures to prevent adverse social and environmental impacts of large-scale hydropower projects. (MONRE, 2012, 35, 36).

9.5. Green Innovation in Laos

The current economic crisis and climate change negotiations should be taken as a great opportunity to move towards a green economy by accelerating eco-innovation. Improving resource and energy use and engaging in a broad range of innovations to improve environmental performance will lead to new industries and new jobs in coming years. (OECD-website, <http://www.oecd.org/innovation/green>). The importance of Science and Technology Innovation (STI) as a pivotal tool in upgrading the industry by mak-

ing use of low-carbon and cleaner technology in ASEAN countries was also emphasized in Thailand-Lao PDR STI Cooperation Workshop in Vientiane in 2012 (Thipayang, 2012).

However, according to Kommasith (2012) there are several challenges for promoting green innovation in Lao PDR. The word “Innovation” in Lao language (Navattakam) is still not a common term. Many people do not understand the importance of innovation and the 7th National Development Plan and its predecessors have not emphasized the importance of innovation. Policy makers may also have other priorities such as poverty reduction and therefore they do not pay enough attention to how innovation can contribute significantly to the achievement of the development goals. Moreover, micro- and medium size enterprises have limited access to finance. Consumers are unwilling to pay a premium price for green products and services, thus not promoting the development of green entrepreneurship and green innovation. (Kommasith, 2012).

There are several areas/issues which need to be improved to enhance green innovation development in Lao PDR. One issue is to create environment to foster green innovation through coordinated horizontal and vertical policy and strategic approach for green innovation in selected sectors that the country has competitive advantages. The country needs to focus on the key industries that it can effectively promote such as ecotourism, organic farming, renewable energy (solar, biomass, biofuel and hydro), electric transportation and environmental conservation activities. (Kommasith, 2012).

Furthermore, promotion of research, transfer, adaptation and dissemination of appropriate green technologies is important. Access to finance of the small and medium sized enterprises to promote green innovation effort needs to be improved. There is a need to incentivize green entrepreneurship and public and private investment in research and development of new environmentally sound technology. Encouraging the long term public private partnership and international cooperation and corroboration is a crucial issue to promote green innovation. (Ibid).

9.6. Challenges for Green Growth

There are various obstacles that will need to be overcome to realize the opportunities of developing green economy sectors, such as domestic supply-side constraints and non-tariff barriers to trade. The institutional and regulatory setting is an important variable in determining whether the outcome is positive or negative on the economy and the environment. Moreover, whether Lao PDR can harness the competitive advantage in these “green” niche sectors will depend to a great extent on private sector initiatives. “Green market opportunities should be integrated into current development policies, such as research and development in the construction-materials sector and niche-market creation”. (Shaw et al., 2007, x, 63).

Soukkhamthat and Chanthavisouk (2013) have outlined some challenges which are facing for green growth in Lao PDR. The green growth is still unclear concept and in an initial stage. The institutional setup is lacking for green growth to integrate the three dimensions (economy, social and environment) of sustainable development in a balanced manner. Also, human resources and capacity is at low level and there is

lack of sustainable financing mechanism. The country is very much dependent on its rich natural resources. Moreover, the adaptive capacity of the poor people is very low.

Recognizing the environmental opportunities that will result from trade liberalization is vital for the sustainable development of industry in Lao PDR. Identifying these opportunities should be a priority for government decision-makers, trade negotiators and industry representatives. “Green market opportunities should be integrated into current development policies, such as research and development in the construction-materials sector and niche-market creation”. (Callander, 2007, 12-13).

9.7. Way Forward

Soukkhamthat and Chanthavisouk (2013) have proposed some steps to enhance the Green economy in the country.

- Establishment of the National Steering Committee and specific institution for green growth to respond for integration of the three dimensions of sustainable development (economy, social and environment) in a balanced manner,
- To further developing the national appropriate policy, strategic, legal framework and guidelines on green growth,
- Strengthening the implementation and enforcement of environmental protection laws and regulations, strategies and action plans related to environment protection,
- Promoting environmental protection activities and clean products, clean technology and sustainable consumption and production, and
- Establishing sustainable financing mechanism for green growth.

Developing Asia including Laos has strengths in its abundant human capital and enjoys the latecomer advantage of having a large window of opportunity to leapfrog to technologies, frameworks, and mechanisms that have been tried and tested in other countries (ADB & ADBI, 2013, 116). The fact that Laos is lagging behind in terms of development is an opportunity to learn from mistakes and good practices of others (Kommasith, 2012).

It will be important to ensure that “going green” does not lead to green protectionism or limit growth, giving rise to new trade restrictions, new conditions for development assistance, and new strategies forcing developing countries like Lao PDR to buy unaffordable technology from developed countries. Although, the Green Economy is important for sustainable development, given current situation further research and capacity development will be needed to understand and put the green economy into practice in ways appropriate to the Lao context. (MONRE, 2012, 55-56).

10. SUMMARY

Findings relevant for planning and management

In this summary we underline major planning issues related to key trends, urbanization, demographic change, industrialization and capacity development.

Urbanization

In this study, we have presented long-run trends related to national urbanization process. We presented also provincial demographic development paths, which indicate that urbanization process is deepening in the future. This imply many challenges for urban and city planning in Laos. There is need for infrastructure planning, housing planning and public service planning. Especially all urban metropolis regions need master plans which are scaled up to growing urban population and their vital needs.

Demographic change

In this research report, we have presented long-run trends related to demographic change in Laos. Our futures analyses indicate that demographic structure of Laos is very favourable for next 20 years in Laos. This situation provides many promising options for industrialisation and rising standards of living in the country. However, also the size of senior population rises gradually and there is need to pay attention to their needs, too. Our study reveals that there are considerable variations in demographic structures of provinces. This issue should be taken in serious consideration in various planning processes.

Industrialisation

In this study we have analysed investment and financial challenges of the Lao PDR. All these analyses indicate that industrial development has started in Laos. This is a big challenge in a country which has relied on agricultural and tropical forestry production. Major challenge is to provide educated professional to various new occupations. There is actually strong need to make competence foresight studies to foresight these new capacity building needs in Laos.

Capacity development

Capacity development is a broad issue in Laos. Trends described above indicate that capacity building needs are increasing in Laos. Urban services, industrial plants, new mines, new hydroelectricity units and modernization of agricultural sector require new talents and professional in Laos. To avoid bottle-necks in these new progressive production units, education system must be developed strongly.

Findings relevant for environmental and energy resource management

The challenges of green growth are increasing and require active capacity building in all the ministries and in the agencies of the Lao PDR. Laos is increasingly suffering from various environmental problems, with (1) deforestation a particularly significant issue. Also (2) commercial exploitation of the forests, (3) plans for additional hydroelectric facilities, (4) foreign demand for wild animals and non-wood forest products for food and traditional medicines, and (5) a growing population all create increasing pressure for sustainable development of the country. Also development gaps between rural areas and urban regions are creating social tensions inside the country. The country has gained positive and great achievements in the battle against poverty, which can be seen in the analyses of this study. Poverty policy with putting the last ones to the first ones is still a very challenging political question in the national politics of Lao PDR. Economic and social benefits and costs of broad utilization of minerals and hydro power need a special attention in the planning activities of the ministries.

Findings relevant for general economic and social planning

In this study we have analysed many economic, social and environmental trends and planning issues of Lao PDR. Generally speaking, many trends are promising and indicating progressive steps from the problems of poverty and social misery. Economic growth has been high in recent years and probably this strong trend is going to continue. While the economy of Lao PDR grows, environmental challenges increase and management of sustainable development becomes more demanding issue. A share of economic growth must be allocated to the protection of environment. Many vital and critical trends of this study indicate to this kind of need in policy-making of the Lao PDR.

The Lao economy depends on investment and trade with its neighbours, Thailand, Vietnam, and, especially in the north, China. The economy of Laos has also experienced growth based development on cross-border trade with Thailand and Vietnam. The economic policy of the Lao PDR has been changing towards more liberal direction. For example, in 2009, despite the fact that the government is still officially communist, the Obama administration in the U.S. declared that Laos was no longer a Marxist-Leninist state and lifted bans on Laotian companies receiving financing from the U.S. Another important step toward liberal economic policy happened in 2011, when the Lao Securities Exchange began trading. Third step was in 2012 that the government initiated the creation of the Laos Trade Portal, a website incorporating all information traders need to import and export goods into the country. Recent years have been full of changes in economic policies towards liberal direction.

Especially free trade area of ASEAN will include many important changes in the Lao PDR. This change requires very careful and tailored public revenue and expenditure policy. Balancing state budget and current account is remaining a challenging issue in the Lao PDR. Our findings in this study reveal considerable variations in revenue and expenditure flows in the state budget. Planning balanced finances of the Laotian economy is going to be very demanding task in these turbulent conditions. The Laotian economy receives much development aid from the IMF, ADB, and other international sources. The role of foreign

direct investment for development of the society, industry, hydropower and mining (most notably of copper and gold) is very important and remains to be at least next 10 years.

Adaptive foresight methodology

One key element of this study was Adaptive Foresight Methodology (AFM). During the research project we followed the logic of the AFM with the following phases: Phase 1: Initial analysis and review, Phase 2: Drafting exploratory framework of scenarios, Phase 3: Specification of exploratory framework of scenarios, Phase 4: Formulation of collective visions and objectives, Phase 5: Identification of challenges associated with each framework scenario, Phase 6: Identification of collective pathways (multiple backcasting), Phase 7: Identification of collective strategies (portfolio analysis), Phase 8: Identification of individual objectives, roles and options, Phase 9: Identification of individual strategies (portfolios) and Phase 10: Realisation and coordination.

In this report we have reported our findings and observations related to the AFM approach. In general, we can note that this methodology has high potential to help sector ministries and agencies in Laos to collaborate and integrate many planning activities. Especially the AFM participatory workshop approach helped various ministries to debate and discuss about various natural resource management and planning problems and challenges in open dialogue.

We found that the integration of forecasting and backcasting approaches is not very easy in the conditions of developing country. One reason for this is that the strategic role of foreign direct investments is so big in the Lao PDR. This implies that there should be broader interactions between national and foreign investors to create better integration process for investments. The lack of public-private dialogues can lead to over-demand or under-supply situations in the arenas of energy and natural resource management. Many capacity building problems could be avoided with better private-public partnerships.

Green growth knowledge platform (GGKP) is a concept, which should be studied carefully in the ministries of the Lao PDR. Next step in natural resource planning in Laos could be integration of GGKP and AFM together in a professional spirit. Our study included also a review to this challenging GGKP issue.

Findings from Green Growth Development in Lao PDR

Due to urbanization and infrastructure development, climate change, degradation of environment, water shortages, deforestation, and food security concerns, the need to undertake an environmentally sustainable path towards “green” growth has been emphasized in Lao PDR in recent years. Green growth can be seen as a means to develop the country’s natural resources in an economically, environmentally and socially sustainable way. The Lao Government has already developed a policy framework (several policies and sectoral strategies) to promote environmentally sustainable green growth. The Government has also incorporated green growth terms and concepts into its national development plans (7th NSDP).

There are several sectors which have potential for green growth in the Lao PDR. These sectors are ecotourism, organic agriculture, silk handicrafts, medicinal plants and spices (non-timber forest products) and

biofuels/RE. For these sectors which are environmentally and livelihood sensitive economic growth is likely to result in an increased potential to develop “green” niche exports where opportunities exist for “win-win” gains for the economy and the environment. Also Science and Technology Innovations (STI) are important in upgrading the industry by making use of low-carbon and cleaner technology. There are challenges related to the use of large-scale hydropower as a promoter of green economy in Lao PDR. Meanwhile as it is an important source for the country’s economic growth and poverty reduction, the high cost of domestic grid extension and the well-known negative social and environmental impacts of hydropower have led to an increase of renewable energy options solutions as a necessary alternative for rural electrification.

There are several challenges facing for green growth in the country. The concept itself is still vague and there is a lack of appropriate mechanism and specific institutional policies for green growth to integrate the three dimensions (economy, social and environment) of sustainable development in a balanced manner. Also shortage of human and technical resources and low capacity and lack of sustainable financing mechanism are big problems. Another thing is high dependence on natural resources and low adaptive capacity for the poor. Critical issues in developing green economy in Lao PDR is to ensure that green economy approaches are a means towards poverty reduction and inclusive human development.

Obviously, statistical information systems need more attention in the future. Green Growth Strategy is not feasible strategy, if updated knowledge and information systems are not available. Better and more reliable knowledge management systems are needed. Knowledge management is about getting the right knowledge to the right agency and people at the right time. Knowledge management in itself may not seem so complex, but it implies a strong tie to Lao government strategy, understanding of where and in what forms knowledge exists, creating processes that span ministerial functions, and ensuring that initiatives are accepted and supported by the government on the highest level. Knowledge management may also include new knowledge creation (new sustainability planning indicators) or it may solely focus on knowledge storage, sharing, and refinement. It is good to understand that better knowledge leads us to better decisions.



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